Appendix G1

Module Handbook of Electronic Information Engineering

Module Name	Course Name	
Module 1 Mathematical and Physics Foundation	Higher Mathematics（1）	
	Higher Mathematics（2）	
	Linear Algebra	
	Probability Theory and Stochastic Process	
	Complex Function	
	College Physics（A）	
	College Physics Experiment（A）	
Module 2 Fundamentals of Computer	College Computer（Experiment included）	
	C Language Programming（Experiment included）	
	Python Programming (Experiment included)	
	C++ program design (Experiment included)	
	JAVA Programming（Experiment included）	
	Applied Technology of Database（Experiment included）	
	Principle and Interface Technology of Microcomputer	
Module 3 General Understanding of the Major	Survey of the Development of Electronic Information Engineering	
	On the new application of electronic technology in life	Three choose one
	Communication Technology in the Information Age	
	Beidou-Leading the Way of Inquiry	
Module 4 Fundamentals of Electronic Technology	Basics of Circuit Analysis（Experiment included）	
	Basics of Electronic Circuits（Experiment included）	
	Digital Circuit and Logic Design（Experiment included）	
	Communication Electronic Circuit（Experiment included）	
	Integrated Design of Electronic Technology Course	
Module 5 Fundamentals of Signal Processing Technology	Signal and System（Experiment included）	
	Digital Signal Process（Experiment included）	
	Information Theory and Coding	
Module 6 Fundamentals of Information Transmission Technology	Electromagnetic Field and Wave	
	Communication Principles	
	Basic Experiment of Communication Technology	

Module Name	Course Name	
	Modern Network Technology（Experiment included）	
	Principle and Technology of Mobile Communication	
Module 7 Advanced Signal Processing Technology	Speech Signal Processing（Experiment included）	
	Digital Image Processing（Experiment included）	
Module 8 Fundamentals of Information System Design	Principle and Application of Single-chip Microcomputer（C Language）（Experiment included）	
	Principle and Application of Single-chip Microcomputer（C Language）（Course Design）	
	Principle and Application of Sensor（Experiment included）	
	Electronic Design Automation（Experiment included）	
	Radio Frequency Identification Technology（Experiment included）	
	Altium Design and application（Experiment included）	
Module 9 Design of Comprehensive Information System	Application of DSP Chip（Experiment included）	
	Embedded System（Experiment included）	
	Design and Innovation of Electronic System（Experiment）	
Module 10 Graduation Project	Corporate/On-campus Internship	
	Graduation Project（Thesis）	
Module 11 English	College English（1）~College English（4）	
	English for IT Professionals	
Module 12 Professional Quality Development	Guidance for College Students' Mental Health	
	Guidence for College Students' Employment and Vocational Development	
	Key Career Abilities	
	Basics for College Students' Entrepreneurship	
	Practice for College Students' Entrepreneurship	
Module 13 Management and Business	Human Resource Management	
	Financial Management	
	Strategic Management of Enterprises in the era of "Internet +"	
	MBA Case Analysis in Information Industry	Two choose one
	Network Ethics and E-commerce Regulations	

Module Name	Course Name	
Module 14 Practice ability of morality, intelligence, physique and aesthetic	Military Theory and Training	
	Physical Education（1）～（4）	
	Celebrity Forum	Two choose one
	Top-teacher Class	
	Ideological Education and Fundamentals of Law	
	Compendium of Modern Chinese History	
	Introduction to Mao Zedong Thought and the Theoretical System of Socialism with Chinese Characteristics	
	Basic Principles of Marxism	
	Situation and Policy	
	Appreciation of classic movies	Two choose one
	Persuasion and reasoning	
	Information technology and society	Three choose two
	Ethics in life sciences	
	History of Western Philosophy	
	On Justice	

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Module 7 Advanced Signal Processing Technology 6

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Module 1Mathematical and Physics Foundation

Module Name	Mathematical and Physics Foundation
Module Code	Module 1
Courses name/ Semester(s) in which the module is taught/ Credit points	Higher mathematics (1)/ 1 / 5ECTS Higher mathematics (2)/ 2 / 5ECTS Linear Algebra / 2 / 4ECTS Probability Theory and Stochastic Process / 3 / 4ECTS Complex Function / 3 / 4ECTS College Physics(A)/ 2 / 4ECTS College Physics Experiment(A)/ 3 / 3ECTS
Person responsible for the module（name/professional ranks and titles）	CHEN Daiguo/Associate Professor
Lecturer （name/professional ranks and titles）	CHEN Daiguo/Associate Professor, WU Chuanzhi/Associate Professor, XIE Guoya/Associate Professor, LIAO Qili/Associate Professor, CUI Haisheng/Associate Professor, ZHANG Xueye/Lecturer, BAOYi/Lecturer, CHENLing/Lecturer, YAN Chunjuan/Lecturer, XIONG Ou/Lecturer, WuXiaorui/Lecturer, WANG Guangchuan/Lecturer, SONG Nana/Lecturer, LUO Xiaoxia/Lecturer, LUO Haozhi/Assistant, LIU Xinxin/Assistant, HE Jin/Lecturer, GUAN Yue/Lecturer, YANG Duowei/Assistant, ZHU Xuanran/Assistant, LI Xuefeng/Assistant
Language	Chinese
Curriculum Attribute	Higher Mathematics(1): compulsory Higher Mathematics(2): compulsory Linear Algebra: compulsory Probability Theory and Stochastic Process: compulsory Complex Function: compulsory College Physics(A): compulsory College Physics Experiment(A): compulsory
Mode of Teaching	Lecture/Discussion/Exercise/Self-study/Presentation/Experiment
Workload	Higher Mathematics(1): Teaching:150hours Higher Mathematics(2): Teaching:150 hours Linear Algebra: Teaching:120 hours Probability Theory and Stochastic Process: Teaching: 120 hours Complex Function: Teaching: 120 hours College Physics(A): Teaching: 120 hours College Physics Experiment(A) Teaching: 90 hours
Credit Points	29
Evaluation Mode	Higher mathematics(1): Homework, questions and classroom quiz account for 40%, and final exams account for 60%.

	Higher mathematics (2): Homework, questions and classroom quiz account for 40%, and final exams account for 60% Linear Algebra: Homework, questions and classroom quiz account for 40%, and final exams account for 60%. Probability Theory and Stochastic Process: Homework, questions and classroom quiz account for 40%, and final exams account for 60%. Complex Function: Homework, questions and classroom quiz account for 40%, and final exams account for 60%. College Physics (A): Homework, questions and classroom quiz account for 40%, and final exams account for 60%. College Physics Experiment (A): The usual performance is 20%, the experimental operation accounts for 50%, and the experimental report accounts for 30%.
Recommended prerequisites	Elementary mathematics, middle school physics
Module objectives/intended learning outcomes	● **Module Objectives:** Through the study of each course of higher mathematics module, students can be familiar with the basic concepts of mathematics course, understand its basic theory, form certain mathematical thinking, master certain mathematical methods. This course is supposed to cultivate students' ability to analyze and solve practical problems by using mathematical methods, and cultivate students' ability to establish mathematical models, providing necessary mathematical basis for learning relevant professional courses and expanding mathematical knowledge. Through the study of this module, students can master the basic concepts, basic theories, basic methods and basic experimental skills of the course in this module. At the same time, they can understand the development and achievements of physics and physics experiments in modern times and their application in engineering technology, so as to cultivate and improve their ability to comprehensively use physics theories to analyze and solve engineering fields. ● **Module Learning Objectives**: Upon successful learning of this module, students should be able to demonstrate the following learning outcomes: 1. Establish dialectical materialist world outlook and scientific attitude, seek truth and acquire abstract thinking ability. 2. Provide mathematical basis for subsequent professional courses related to network engineering. 3. Be able to use mathematical knowledge to calculate and judge, and use mathematical tools to solve some problems, including calculation and

	reasoning. 4. Understand the application of college physics and physical experiments in natural science and engineering technology, as well as the relationship between the penetration of related sciences. 5. Master the representation and application of vector and calculus in physics. 6. Learn to use the basic methods and principles of physics to analyze various practical problems in engineering practice, and have basic physical thinking ability.
Course Name / Course Objectives / Key Knowledge	**Course Name:Higher Mathematics(1)** **Course Objectives:** **After learning the courses, students can obtain the following objectives:** 1. Grasp the basic knowledge and basic theory of univariate function calculus; 2. Have skilled and accurate basic operation ability, strong abstract thinking ability, logical reasoning ability and spatial imagination ability; 3. Have a certain mathematical modeling idea, and be able to apply this idea to the whole process of raising, analyzing and solving problems; 4. Understand the relationship between higher mathematics knowledge and professional ideas and practical skills; 5. Have the general ability to apply mathematical ideas, concepts and methods to understand, summarize, abstract and solve relevant courses and engineering technical problems of the specialty; 6. Be able to use mathematical thinking to solve practical problems encountered in work, enhance understanding and interest in mathematics, and meet the needs of social and economic development. **Key Knowledge:** **Chapter 1 Function, Limit And Continuity** 1. Sets and functions 2. Elementary function 3. Definition and properties of sequence and function limit 4. Infinitesimal and infinity 5. Calculation of function limit and existence criterion of limit 6. Two important limits 7. Equivalent infinitesimal 8. Continuity of function 9. Basic properties of continuous functions 10. Function, limit and continuous exercises **Chapter 2 Univariate Functional Differentiation And Its Application** 1. The concept of derivative, derivation of simple function, and the relationship between derivability and continuity

2. Basic derivation formula of function, inverse function derivation method
3. Derivative method of composite function, higher derivative
4. Implicit function derivation method, function derivation method determined by parameter equation
5. Differentiation of function
6. Differential mean value theorem
7. Lobida's law, Taylor's mean value theorem
8. Monotonicity and extremum of function
9. Concavity and convexity of curve, inflection point and description of function graph
10. Maximum and minimum, curvature
11. Exercise class of univariate function differential and its application

Chapter 3 Univariate Function Integration

1. Concept and properties of indefinite integral
2. The first kind of transformation integral method
3. The second kind of substitution integral method
4. Partial integral method
5. Indefinite integrals of several special functions
6. Concept and properties of definite integral
7. Basic formula of calculus
8. Substitution method and partial integration method of definite integral
9. Generalized integral
10. Univariate function integral lesson
11. General review

Course Name: Higher Mathematics (2)

Course objectives:

Through the study of this course, students can achieve the following objectives:

1. Master the application of definite integral, basic concepts, basic theories and basic operation skills of ordinary differential equation, vector algebra and space analytic geometry, multivariate function calculus, infinite series, etc;

2. Have skilled and accurate basic operation ability, good abstract thinking and logical reasoning ability and strong spatial imagination ability;

3. Have the ability to summarize the practical problems encountered in abstract engineering technology with mathematical ideas, concepts and methods, and have the ability to solve the problems.

Key Knowledge:

	Chapter 1 Geometric and Physical Applications of Definite Integral 1.Area of plane graphics 2. Volume of three-dimensional space 3. Arc length of curve 4. Examples of the application of definite integral in Physics **Chapter 2 Ordinary Differential Equations** 1. Concept of differential equation 2. First order differential equation 3. Second order differential equation **Chapter 3 Vector and Space Analytic Geometry** 1. Vector and its operation 2. Plane and its equation 3. Straight line and its equation 4. Surfaces and curves **Chapter 4 Differential Calculus of Multivariate Functions** 1. Concept of multivariate function 2. Limit and continuity 3. Partial derivative and total differential of multivariate function 4. Derivation of multivariate composite function 5. Derivation and directional derivative of implicit function 6. Application of differential calculus of multivariate functions **Chapter 5 Integration of Multivariate Functions** 1. Concept, properties, calculation and application of double integral 2. Concept, properties and calculation of triple integral **Chapter 6 Infinite Series** 1. Concept and properties of constant term series 2. Convergence criterion of constant term series 3. Convergence of power series and expansion of function 4. Fourier series **Course Name: Linear Algebra** **Course Objectives:** Through the study of this course, students can achieve the following objectives: 1. Acquire the basic knowledge and theory of linear algebra; 2. Master the necessary mathematical operation skills and the ability to use mathematical software for complex calculation of linear algebra; 3. Further cultivate, train and improve students' ability to analyze and solve problems (including solving practical problems) by using mathematical methods;

	4. Broaden the scope of mathematical knowledge and provide students with necessary mathematical basis for learning subsequent professional courses and postgraduate entrance examination; 5. Provide applicable mathematical methods and calculation means for scientific research and practical work; Meet the basic requirements for linear algebra in subsequent courses of communication engineering; 6. Master the method of calculating determinant and rank of matrix, and be able to judge the linear correlation of vector group in combination with the transformation of linear equations into matrix product and matrix rank. **Key Knowledge:** **Chapter 1 Determinant** 1. Arrangement 2. Exchange 3. Determinant 4. Properties of determinant 5. Expansion of determinant 6. Clem's law **Chapter 2 Matrix** 1. Matrix and its basic operation 2. Inverse matrix 3. Elementary transformation of matrix 4. Block matrix 5. Rank of matrix **Chapter 3 Vector Group and Its Linear Correlation** 1. N-dimensional vector and its linear operation 2. Linear correlation of vector group 3. Judgment theorem of linear correlation 4. Rank of vector group 5. Vector space **Chapter 4 System of Linear Equations** 1. Homogeneous linear equations 2. Nonhomogeneous linear equations **Course Name: Probability Theory and Stochastic Process** **Course Objectives:** Through the study of this course, students can achieve the following objectives: 1. Understand the basic concepts in probability theory, master the properties and formulas of probability, and be able to calculate simple probability; 2. Master the statistical description of random variables, be able to use the

	distribution law, probability density function and distribution function to calculate the probability of relevant events, be able to calculate the joint distribution law and edge distribution law of two-dimensional discrete random variables, be able to calculate the edge density function from the joint density function, and judge whether the two random variables are independent; 3. Master the numerical characteristics of random variables, calculate the mathematical expectation, variance, covariance and correlation coefficient of random variables, and memorize the mathematical expectation and variance of six common distributions; 4. Understand Chebyshev inequality, understand the law of large numbers, master the central limit theorem, and be able to use Chebyshev inequality and central limit theorem for approximate calculation; 5. Understand the concept of random process and its statistical description, be familiar with some common random processes, and calculate the numerical characteristics of random processes; 6. Master the finite dimensional distribution and ergodicity of Markov chain, be able to calculate the finite dimensional distribution according to the one-step transition probability matrix and initial distribution of homogeneous Markov chain, and judge whether it has ergodicity. Discrete mathematics is the theoretical basis of computer science, which plays an important role in cultivating students' logical thinking and ability to analyze and solve problems. The teaching of discrete mathematics can not only lay a solid foundation for students' professional course learning and future software and hardware development and application research, but also cultivate their abstract thinking and strict logical reasoning ability. **Key Knowledge Points:** **Chapter 1 Basic Concepts of Probability Theory** 1. Random test, sample space, random event 2. Frequency and probability 3. Equal probability profile 4. Conditional probability, multiplication formula, full probability formula and Bayesian formula 5. Independence **Chapter 2 One Dimensional Random Variables and Their Distribution** 1. Random variables and their distribution functions 2. Discrete random variables and their distribution law 3. Continuous random variable and its probability density 4. Distribution of functions of random variables **Chapter 3 Multidimensional Random Variables and Their Distribution**

	1. Two dimensional random variables and their distribution functions 2. Edge distribution 3. Conditional distribution 4. Independent random variables 5. Distribution of functions of two random variables **Chapter 4 Numerical Characteristics of Random Variables** 1. Mathematical expectation 2. Variance 3. Covariance and correlation coefficient 4. Moment and covariance matrix **Chapter 5 Law of Large Numbers and Central Limit Theorem** 1. Law of large numbers 2. Central limit theorem **Chapter 6 Stochastic Process and Its Statistical Description** 1. Concept of stochastic process 2. Statistical description of stochastic process 3. Poisson process and Wiener process **Chapter 7 Markov Chain** 1. Markov process and its probability distribution 2. Multistep transition probability 3. Finite dimensional distribution 4. Ergodicity **Course Name: Complex Function** **Course Objectives:** Students will achieve the following objectives by studying the course: 1. Know the development background of function of complex variable and the origin of related theorem. 2. Understand and master basic concept and theorie. 3.Skilled command of basic calculation (complex number, judging derivability and analyticity, complex integral, the expansion of function, the judgment of isolated singularity, the computation of residues and so on). 4. Consolidate and deepen the understanding of the relevant knowledge of calculus. **Key Knowledge:** **Chapter 4 Complex Number and Complex Plane** 1. Complex number 2. The point set of complex planes 3. Expansion of the complex plane and its spherical representation 4. Exercise lesson of complex number and complex plane

	Chapter 5 Analytic Function 1. The concept, limit and continuity of functions of complex variable 2. The concept of analytic function 3. Sufficient and necessary condition for differentiability and analysis of function 4. Elementary function 5. Exercise lesson of analytic function **Chapter 6 The Integral of Function of Complex Variable** 1. The concept of integral of function of complex variable 2. Cauchy-GusaTheorem and its generalization 3. Cauchy integral formula and its corollary 4. The relationship between analytic and harmonic function 5. Exercise lesson of integral of function of complex variable **Chapter 7 Series Representation of Analytic Function** 1. Series of complex term 2. Power series 3. Taylor's expansion of analytic function 4. Laurent expansion of analytic function 5. Isolated singularity 6. Exercise lesson of series for analytic function **Chapter 8 Residue Theory and Its Application** 1. Residue 2. Total review **Course Name: College Physics (A)** **Course Objectives:** Through the study of this course, students can achieve the following objectives: 1. By learning the basic knowledge of electrostatic field, students can use Gauss theorem to solve the field strength of some charged bodies with symmetrical electric field distribution. 2. Be able to use ampere loop theorem to solve the magnetic field distribution of current carrying line. 3. Master the electromagnetic induction phenomenon and its conditions, as well as the cause and essence of induced electromotive force; Understand the practical application of electromagnetic induction and master the engineering practical application of electromagnetic induction. 4. Master the interference principle of light and be able to apply optical knowledge to engineering measurement. Key knowledge points:

	Chapter 1 Electrostatic Field 1. Charge and Coulomb's law 2. Electric field and electric field strength 3. Gauss theorem in electrostatic field 4. Work of electrostatic field force 5. Potential 6. Electric field intensity and potential gradient **Chapter 2 Steady Magnetic Field** 1. Magnetic field and magnetic induction intensity 2. Biot Savart law 3. Gauss theorem and ampere loop theorem of magnetic field 4. Effect of magnetic field on moving charge and current carrying conductor 5. Magnetic medium. **Chapter 3 Electromagnetic Induction** 1. Basic law of electromagnetic induction 2. Dynamic electromotive force and induced electromotive force 3. Application of electromagnetic induction 4. Energy of electric field 5. Electromagnetic field and electromagnetic wave. **Chapter 4 Fluctuation of Light** 1. Light wave 2. Interference of light 3. Diffraction of light 4. Polarization of light **Course Name: College Physics Experiment (A)** **Course Objectives:** Through the study of this course, students can achieve the following objectives: 1. Learn the basic knowledge of measurement error analysis and uncertainty evaluation, as well as experimental data processing, and be able to select different experimental methods to process data, such as list method, graphic method, least square method, etc. 2. Carry out the basic training of experimental methods and experimental skills, can independently complete the operation part of the experiment, and learn to correctly record the experimental data, so as to gradually improve the hands-on operation ability and the independent working ability of integrating theory with practice. 3. Complete the writing of the experimental report, do a good job in the

	processing and error analysis of the experimental data, and make a serious summary, so as to make it have the ability of preliminary scientific experiment. **Key Knowledge:** **Chapter 1 Introduction** 1. Purpose, significance and requirements of Physics Experiment Course 2. Learning methods of physics experiment class. **Chapter 2 Measurement Error Theory and Data Processing Basis** 1. Understand relevant knowledge of measurement and error theory and data processing 2. Meaning and calculation of measurement uncertainty. 3. Concept and algorithm of significant digits 4. Basic methods of experimental data processing **Chapter 3 Basic Physics Experiment** 1. Measurement of length and density 2. Measurement of Young's modulus of elasticity of metal wire by tensile method 3. Measurement of volt ampere characteristics of electronic components 4. Use of potential difference meter 5. Resistance measurement with Wheatstone bridge 6. Adjustment and use of oscilloscope 7. Measurement of grating constant 8. Newton Ring Interference Experiment **Chapter 4 Modern Physics Experiment** 1. Adjustment and use of Michelson interferometer 2. Measurement of sound velocity in different media 3. Determination of Planck constant by photoelectric effect **Chapter 5 Design Physics Experiment** 1. Modification and correction of electric meter
Study and examination requirements and forms of examination	Higher Mathematics (1): Written examination Higher Mathematics (2): Written examination Linear Algebra: Written Exam Probability Theory and Random Process: Written Exam Complex Function: Written Exam College Physics (A): Written Exam College Physics experiment (A): 15 experiment reports.
Media employed	Projector / blackboard / electronic document / display stand / ppt courseware / laboratory
Reading list	1. Department of mathematics, Tongji University. Advanced mathematics

volume I [M]. Beijing: People's Posts and Telecommunications Press, 2016.
2. Department of mathematics, Tongji University. Complete solutions to advanced mathematics exercises Volume I [M]. Beijing: People's Posts and Telecommunications Press, 2016.
3. HUANG Lihong, et al. Advanced mathematics volume 1 [M]. Fudan University Press, 2010.
4. FU Lizhen, et al. Higher mathematics counseling lecture [M]. Northwest University of Technology Press, 2007.
5. Department of mathematics, Tongji University. Advanced Mathematics (Part 2),Sixth Edition) [M]. Beijing: Higher Education Press, June 2007.
6. Department of mathematics, East China Normal University. Mathematical analysis（Fourth Edition) [M]. Beijing: Higher Education Press, July 2010.
7. QIU Weisheng. Analytic geometry [M]. Beijing: Peking University Press, July 2008.
8. DING Tongren, Li Chengzhi. Course of ordinary differential equations [M]. Beijing: Higher Education Press, July 2004.
9. PAN Xianbing, linear algebra and its applications [M]. Tsinghua University Press, August 2017.
10. Tongji University, linear algebra [M]. Higher education press, May 2007.
11. PAN Xianbing, Jin Yanhong, Xiong ou. Probability theory and mathematical statistics [M]. Beijing: Tsinghua University Press, 2017.
12. SHENG Ju, XIE Shiqian, PAN Chengyi. Probability theory and mathematical statistics（Fourth Edition) [M]. Beijing: Higher Education Press, 2008.
13. WANG Yuxiao, LIU Jinfu. Probability theory, stochastic process and mathematical statistics（Second Edition) [M]. Beijing: Beijing University of Posts and Telecommunications Press, 2010.
14. MA Wenwei. Physics [M]. Volume I and Volume II of the fifth edition. Beijing: Higher Education Press, 2009.
15. ZHAO Kaihua, new concept physics course [M]. Higher education press, February 1986.
16. ZHANG Sanhui. College physics. Beijing: Tsinghua University Press, 1999.
17. WU Baishi. Fundamentals of college physics. Beijing: Science Press, 2007.
18. ZHOU Dianqing. University physics experiment [M]. Wuhan: Wuhan University Press, 2002.
19. JIA Yurun, University Physics Experiment [M]. Shanghai: Fudan University Press, 1987.
20. TRISTAN Needham (nidam) / translated by Qi Minyou, visual complex

	analysis, Beijing: People's Posts and Telecommunications Publishing House. 21. Written by AHLFORS / translated by ZHAO Zhiyong, etc., complex analysis, Beijing: Machinery Industry Press. 22. ZHONG Yuquan, complex function theory, higher education press. 23. FANG Qiqin, course of complex variable function, Peking University Press.

Module 2 Fundamentals of Computer

Module Name	Fundamentals of Computer
Module Code	Module 2
Courses name/ Semester(s) in which the module is taught/ Credit points	College computer (Experiment included) / 1 / 4 ECTS C language programming (Experiment included) / 2 / 4 ECTS Python Programming (Experiment included) / 2 / 4 ECTS C++ program design (Experiment included) / 3 / 4 ECTS Java programming (Experiment included) / 3 / 4 ECTS Applied Technology of Database（Experiment included） / 3 / 4 ECTS Principle and Interface Technology of Microcomputer / 4 / 4 ECTS
Person responsible for the module（name/professional ranks and titles）	ZHI Honglei / Senior Engineer
Lecturer （name/professional ranks and titles）	ZHENG Xianfeng / Associate Professor, XIONG Zhuang / Associate Professor, LIANG Lanhua / Associate Professor, JIANG Bing / Associate Professor, WANG Liyan / Associate Professor, YAN Huifeng / Associate Professor, ZHANG Ling / Associate Professor, LIU Ying / lecturer, ZHI Honglei / Senior Engineer, WANG Ning / lecturer, FANG Xiaoyan / Assistant, LIU Xiaojuan / lecturer, LIN zejin / Senior Engineer, XIAO Ming / lecturer, ZHANG Hua / lecturer.
Language	chinese
Relation to curriculum	College computer (Experiment included): compulsory C language programming (Experiment included): compulsory Python Programming (Experiment included)：compulsory C++ program design (Experiment included)：compulsory Java programming (Experiment included): compulsory Applied Technology of Database (Experiment included): compulsory Principle and Interface Technology of Microcomputer: compulsory
Type of teaching, contact hours	Lecture / discussion / practice / autonomous learning / demonstration / experiment
Workload	College computer (Experiment included): Teaching: 120 hours C language programming (Experiment included): Teaching: 120 hours Python Programming (Experiment included)：Teaching: 120 hours C++ program design (Experiment included)：Teaching: 120 hours Java programming (Experiment included): Teaching: 120 hours Applied Technology of Database (Experiment included): Teaching: 120 hours Principle and Interface Technology of Microcomputer: Teaching: 120 hours
Credit points	20
Requirements according to the examination regulations	College computer (Experiment included): homework, questions and usual inspection account for 20%, experiment accounts for 20%, and final examination accounts for 60%

	C language programming (Experiment included): homework, questions and usual inspection account for 20%, experiment 20% and final examination 60% Python Programming (Experiment included)：homework, questions and usual inspection account for 20%, experiment 20% and final examination 60% C++ program design (Experiment included)：homework, questions and usual inspection account for 20%, experiment 20% and final examination 60% Java programming (Experiment included): homework, questions and usual inspection account for 20%, experiment 20% and final examination 60% Applied Technology of Database (Experiment included): homework, questioning and usual inspection account for 20%, experiment 20% and final examination 60% Principle and Interface Technology of Microcomputer: 40% of homework, questions and usual inspection, and 60% of final examination
Recommended prerequisites	Basic knowledge of mathematics and university computer, using mathematical theory to analyze problems.
Module objectives/Intended Learning Outcomes	● **Module objectives:** Master the basic concepts, basic principles, basic design and analysis methods of computer principles, and understand the ways and methods to improve the performance of computer components and hardware of the whole machine; Understand the basic concept and principle of operating system, be familiar with the composition, structure, function and design of operating system, and master the design method and common implementation technology of operating system; Master the basic skills of using computer. Cultivate students' basic ability to use and analyze computer systems, enhance the development ability, engineering practice ability, teamwork ability and innovation consciousness of large-scale system software, improve professional quality, and lay the foundation for subsequent professional courses. ● **Intended Learning Outcomes：** Upon successful learning of this module, students should be able to demonstrate the following learning outcomes: 1. Master the basic concepts, basic principles, basic design and analysis methods of computer principles, and understand the ways and methods to improve the performance of computer components and hardware of the whole machine; 2. Understand the basic concepts and principles of operating system, understand the implementation mechanism and methods of modern operating system, and master the basic principles, methods and typical algorithms of process management, memory management, equipment management and file management;

	3. Master the basic skills of using computer; 4. Understand the development trend and cutting-edge technology of computer system; 5. Initially have the development ability, engineering practice ability and team cooperation ability of large-scale system software; 6. Initially have comprehensive quality and innovation awareness of engineering projects.
Course Name / Course Objective / Core Knowledge	**Course Name: College Computer（Experiment included）** **Course objectives:** Through the study of this course, students can achieve the following objectives: 1. Understand the new concepts and technologies in the development of information technology, master the development stage of computer, the composition of computer system, the binary system and mutual conversion in computer, the measurement unit of information, understand the concept, performance and prevention of computer virus, and understand the concept and characteristics of multimedia technology; 2. Have the basic ability to use microcomputer operating system, and master the basic use method of Windows operating system, the use of file system and resource manager, the installation and setting of input method, and the common settings of hardware and software; 3. Understand the basic functions of the document editing software word, master the use method of word, and be able to skillfully use word to edit and typeset documents (mixed text and text); 4. Understand the basic functions of spreadsheet software Excel. Master the use method of Excel, be able to skillfully use Excel to make common spreadsheet documents, carry out statistical calculation, chart generation and format setting; 5. Understand the basic functions of presentation software PowerPoint. Be proficient in making PowerPoint presentation documents; 6. Understand the functions of computer LAN and Internet, be proficient in using browser for information retrieval, and master the use of e-mail receiving and sending (including attachments). Master the method of downloading files; 7. Have the ability to analyze and solve practical problems by using the knowledge learned. **Core Knowledge :** **1. Basic Knowledge of Computer** Classification and development trend of computer; Numeration system and different base conversion; Composition of computer system;

	Definition, characteristics and prevention of computer virus. **2. Operating System** Definition and function of operating system; Basic introduction of Windows 7 operating system; Relevant operations on files and folders; Use of control panel in Windows 7 operating system ; Keyboard shortcuts and key combinations in Windows 7 operating system. **3. Word 2010 Document Editing Software** Text editing, character formatting, paragraph processing and typesetting in word 2010 Picture -graphic editing , image-text combining in word 2010 ; Word 2010 charts creating and editing; Word 2010 page formatting and printing; Word 2010 integrated application. **4. Excel 2010 Spreadsheet Software** Basic understanding of Excel 2010; Basic operations of Excel 2010 workbooks, worksheets and cells; Input of different types of data and special data in Excel 2010; Creation and application of formulas and functions in Excel 2010; Excel 2010 data processing operations: sorting, filtering, grouping in Pivot Table, etc.; Excel 2010 page setup and printing; Excel 2010 integrated application. **5. PowerPoint 2010 Presentation Software** Presentation creating and editing ; Presentation exterior designing: theme and background settings; Animated objects setting and slide -mode switching; Slide-mode setting; Presentation page setting and printing; PowerPoint 2010 integrated application. **6. Fundamentals of Computer Networking** Development, basic concepts, functions and protocols of computer network; Application of network software (Internet Explorer); Common internet accesses. **7. Comprehensive Exercises And Course Summary** **Course Name: C language Programming (Experiment included)** **Course objectives:** Through the study of this course, students can achieve the following

	objectives: 1. Master the basic theory, basic programming methods, basic contents and main application fields of C language; 2. Have the ability to communicate smoothly, learn creatively, analyse and solve problems independently; 3. Have strong comprehensive analysis ability, problem-solving ability, and higher-level computer programming skills . **Core Knowledge:** **Theoretical teaching content:** **Chapter 1 Introduction Of Computer, Program And C Language** 1. Computer and its basic structure 2. Computer program and computer language 3. Introduction to C language 4. Conversion in numeration system **Chapter 2 Introduction of C Source Program And Its Data Types** 1. Learn the components of C source program 2. Basic data types 3. Presentation of constants 4. Initialization, definition and reference of variables 5. Representation of basic data inside the computer **Chapter 3 Operators And Expressions** 1. Definition of operators and expressions 2. Operator priority and Associativity 3. Use of common operators 4. Data type conversion 5. Bitwise operator **Chapter 4 Procedure Flow Control** 1. C language statement and process control 2. Sequential structure 3. Select structure 4. Conditional operator 5. Select structure application 6. Circulation structure 7. Nested structure 8. Goto statement, break statement and continue statement **Chapter 5 Basic Knowledge of Functions** 1. Definition of function 2. Function call 3. Function declaration 4. Nested function call

	5. Recursive function call **Chapter 6 Array** 1. Definition of one dimension 2. One-dimensional initialization 3. One -dimensional reference 4. One-dimensional application 5. Insertion and deletion of array elements 6. Array-element searching and sorting 7. Definition of two-dimensional array 8. Initialization of two-dimensional array 9. Two-dimensional array reference 10. Two-dimensional array application 11. Inserting and sorting of array elements 12. Searching and sorting of array elements **Chapter 7 Pointer** 1. Concept of pointer 2. Pointer variables as function parameters 3. Pointer and function 4. Pointer and array 5. Pointer-array 6. Command line parameters 7. Dynamic array creating by using pointers 8. Pointer and string **Chapter 8 String** 1. Definition and initialization of string 2. Method of processing string with character array and character pointer 3. Input and output of string 4. Use of related string-processing functions **Chapter 9 Compilation Preprocessing Commands And Multi-file Organizing Program** 1. Compile preprocessing instructions 2. Multi-file organizing procedure **Chapter 10 Structure, Union And Enumeration** 1. Structure type and structure variable 2. Joint type and joint variable 3. Enumeration type and enumeration variable **Chapter 11 Files** 1. Basic concepts of files 2. Opening and closing files 3. File error check

	4. File-data reading and writing in sequence 5. Random reading and writing of file data 6. Preprocessing commands and macro definitions 7. Enumeration example 8. Example of bit operation **Experimental Teaching:** 1. Initial C source program experiment 2. Program flow experiment 3. Function experiment 4. Array experiment **Course Name:** Python Programming (Experiment included) **Course objectives:** Through the study of this course, students can achieve the following objectives: 1. Have basic data analyzing and processing ability, language expressing and writing ability, information collecting and processing ability; Based on the principle of software engineering, according to the realization process of project engineering, carry out demand analysis, determine the solution and implement it; 2. Be able to solve general software engineering problems, design software systems for specific needs and develop reusable modules or components with innovation awareness in the process; **Core knowledge points:** **Theoretical teaching content:** **Chapter 1 Python Language Overview** 1.1 Preliminary program design 1.2 Python language and features 1.3 Simple Python language program 1.4 Python language developing environment **Chapter 2 Data Types, Operators and Expressions** 2.1 Data type 2.2 Constants and variables 2.3 Operators and expressions 2.4 Priority and associativity of operators **Chapter 3 Sequential Program Design** 3.1 Algorithm 3.2 Basic structure of the program 3.3 Data input and output

	3.4 Example of sequential program design **Chapter 4 Select Structure Programming** 4.1 Single branch selection structure 4.2 Double branch selection structure 4.3 Multi branch selection structure 4.4 Select structure nesting 4.5 Example of structure selection procedure **Chapter 5 Loop Structure Program Design** 5.1 While loop structure 5.2 For statement structure **Chapter 6 Sequence** 6.1 List 6.2 Tuples 6.3 String **Chapter 7 Dictionaries and Collections** 7.1 Dictionary 7.2 Collection **Chapter 8 Functions and Modules** 8.1 Function overview 8.2 Function definition and call 8.3 Function parameters and return values **Chapter 9 Documents** 9.1 Document overview 9.2 Opening and closing documents 9.3 Document reading and writing 9.4 Document positioning 9.5 Document-related modules 9.6 Document application examples **Chapter 10 Exception Management** 10.1 Abnormality 10.2 Exception handling in Python 10.3 Custom exception 10.4 Assertion and context management **Experimental teaching:** Experiment 1: input and output, data type; Experiment 2: selection structure and cycle structure; Experiment 3: function parameters and return, recursion algorithm; Experiment 4: object-oriented programming. **Course Name:** C++ Program Design (Experiment included)

	Course objectives: Through the study of this course, students can achieve the following objectives: 1. Make students understand the development, characteristics and background of C + + language; 2. Through the study and training of the basic knowledge, basic concepts and basic skills of C + + language process, students can master the basic process oriented methods and ideas in C + + and master the basic theory, methods and skills of "C + + language" program design; 3. Cultivate students' basic ability to use the most popular object-oriented programming language c + + for programming, and lay a foundation for the follow-up computer related courses and object-oriented programming in a visual environment. **Theoretical teaching content:** **Chapter 1 Overview of C + + language** 1.1 Development of C + + language 1.2 C + + Program Overview 1.3 Use of Visual C + + 6.0 integrated environment 1.4 Data type of C + + language **Chapter 2 Data types, Operators and Expressions** 2.1 Data type 2.2 Operators 2.3 Expression **Chapter 3 Procedure Structure** 3.1 Sequential structure; 3.2. Branch structure; 3.3. Loop structure; **Chapter 4 Functions** 4.1 Structured program design 4.2 Concept of function 4.3 Function call 4.4 Parameter transfer 4.5 Special call of function 4.6 Scope and lifetime of variables 4.7 Function overloading 4.8 Inline function 4.9 Function template **Chapter 5 Pointer** 5.1 Concept of pointer and pointer variable 5.2 Dynamic memory allocation (new and delete operators)

	5.3 String class **Chapter 6 classes and objects** 6.1 Overview of object-oriented programming 6.2 Definition of class 6.3 Definition and use of objects 6.4 Constructors and destructors 6.5 Object members 6.6 C++ friend 6.7 Static members 6.8 Normal type 6.9 Class template 6.10 Character string processing by using the string class **Chapter 7 Class Inheritance** 7.1 Inheritance and derivation 7.2 Inheritance method of derived class and base class 7.3 Constructor and destructor of derived class 7.4 Identification of members with the same name in a class with inheritance relationship 7.5 Virtual base class 7.6 Pointer variables to base and derived classes **Chapter 8 Polymorphism** 8.1 Concept of polymorphism 8.2 Virtual function 8.3 Pure virtual function and abstract class 8.4 Operator overloading Chapter 9 Input / Output & Exception Handling 9.1 Concept of C + + stream 9.2 Input / output format 9.3 Input / output of documents 9.4 Exception handling mechanism **Experimental teaching:** Experiment 1: function Experiment 2: class definition and object creation Experiment 3: constructor and destructor Experiment 4: static members and object members Experiment 5: C++ friend Experiment 6: String class Experiment 7: Inheritance and derivation Experiment 8: Virtual functions and abstract classes Experiment 9: Operator overloading

	Experiment 10: Stream class library Experiment 11: Exception handling **Course Name: Java Programming (Experiment included)** **Course objectives:** Through the study of this course, students can achieve the following objectives: 1.Understand Java's platform-independent, object-oriented, multi-threading features etc.. 2. Master the object-oriented programming method of Java language. 3.Master the programming skills of network programming, multi-threading programming and GUI design in Java. 4. Cultivate students' thinking methods and basic abilities of using java to solve practical problems. **Core Knowledge:** **Theoretical Teaching Content:** **1. Fundamentals of Java Programming** (1) The main features of Java; (2) Introduction to Java development and operation platform; (3) Structure of simple java program; **2. Data Types, Operators And Expressions** (1) Identifiers and keywords; (2) Java basic data type; (3) Conversion of data types; (4) Operators and expressions; **3. Java Program Control Statement** (1) Branch structure statement; (2) Loop structure statement; (3) Jump statement; **4. Class And Object** (1) Object-oriented concept and methodologies; (2) Basic concepts of class and object; (3) Constructors, methods and properties in Class and Objects (4) Static variables and methods; (5) Understanding of method overloading and static polymorphism; (6) Packages creating and accessing ; (7) Access control authorization ; **5. Arrays And Strings** (1) Definition and use of one-dimensional array and two-dimensional array; (2) Application of string class;

	(3) Application of String Buffer class; **6. Inheritance And Interface** (1) Class inheritance, runtime polymorphism; (2) Packages creating and accessing; (3) Definition and use of abstract classes; (4) Definition and use of interfaces; **7. Exception Handling** (1) The basic concept of anomaly; (2) Java exception class hierarchy; (3) Exception handling: catching and throwing; **8. Input / Output Stream And File Operation** (1) Basic concepts of input-output flow; (2) Management of documents and directories; (3) Standardized input / output; (4) File input / output stream; (5) Data input / output stream; **9. Multi-threading** (1) The concept of program, process and thread; (2) Creation of java thread; (3) Thread state and thread control; (4) Process synchronization method and significance. **10. GUI Programming** (1) Java GUI overview; (2) Java GUI layout management; (3) Use of important GUI components; (4) Event handling process in Java; **11. Java Network Programming** (1) Basic concepts of network programming: network protocol, IP address, port, URL, etc.; (2) Use of URL class and InetAddress class; (3) Socket-based communication; **12. Database Programming** (1) JDBC overview (2) Accessing the database through JDBC **Experimental Teaching Content:** 1. JDK installation and configuration; 2. Fundamentals of Java language programming; 3. Object-oriented programming in Java language; 4. Key Java class libraries application; 5. GUI programming;

	6. Design and implementation of online store based on C / S architecture **Course Name:Applied Technology of Database（Experiment included）** **Course objectives:** Through the study of this course, students can achieve the following objectives: 1.Master data model, relational model, SQL statement and standardized theory; 2. Master database design and transaction processing technology 3. Understand database integrity and security 4. Master SQL Server 2008 programming 5. Understand stored procedures and triggers **Core Knowledge:** **Theoretical teaching:** **Chapter 1 Overview of MySQL Database** 1. Database overview 2. Database architecture 3. E-R diagram 4. Database design **Chapter 2 MySQL Overview** 1. Reasons for choosing MySQL database 2. MySQL features 3. Installation and configuration of MySQL server **Chapter 3 MySQL Database Management** 1. Database creation 2. Content view of database 3. Database selection 4. Database modification 5. Database deletion 6. Application of database storage engine **Chapter 4 MySQL Table Structure Management** 1. MySQL data type 2. Table creation 3. Table structure modification 4. Table deletion 5. Index Setting 6. Constraint definition **Chapter 5 Updating Operations on Table Records** 1. Table records insertion

	2. Table Records modification 3. Table records deletion **Chapter 6 Table Records Retrieval** 1. Basic query statement 2. Single-table query 3. Aggregate function query 4. Connection query 5. Sub query 6. Query results mergence 7. Table definition and field aliases creation 8. Table definition and field aliases creation 9. Query with regular expressions **Chapter 7 View** 1. View overview 2. View creation 3. View operation **Chapter 8 Trigger** 1. MySQL trigger 2. Trigger view 3. Use of trigger 4. Trigger deletion **Chapter 9 Stored Procedures And Stored Functions** 1. Stored procedures and functions creation 2. Stored procedures and functions call 3. Stored procedures and functions view 4. Stored procedures and functions modification 5. Stored procedures and functions deletion **Chapter 10 Data Backup And Recovery** 1. Data backup 2. Data recovery 3. Database migration 4. Import and export of tables **Chapter 11 MySQL Performance Optimization** 1. Optimization overview 2. Query optimization 3. Database structure optimization 4. Multi-table query optimization **Chapter 12 Transaction And Lock Mechanism** 1. Transaction mechanism 2. Locking mechanism

	3. Isolation levels of transactions **Chapter 13 Case of comprehensive development - library management system** 1. Development background 2. System analysis 3. Preliminary knowledge of JSP 4. System design 5. System Preview 6. Database design 7. Common module design 8. Main interface design 9. Administrator module design 10. Design of book borrowing and returning module **Experimental Teaching:** 1. Data definition and updating sentence practice experiment 2. Table building experiment 3. Simple query and connection experiment 4. Modifying table and deleting table 5. Grouping query and nested query experiment 6. Entity integrity constraint experiment 7. View experiment 8. Stored procedure experiment **Course Name: Principle and Interface Technology of Microcomputer** **Course objectives:** Through the study of this course, students can achieve the following objectives: Being able to write assembly language programs skillfully; Being able to write programs to apply common programmable interface chips; Having the application ability of microcomputer hardware system; Having the ability of hardware and software collaborative development. **Key Knowledge:** **Chapter 1 Overview** 1.1 microcomputer interface and interface technology; Interface function; 1.3 composition of interface; 1.4 structural form of interface circuit; 1.5 data exchange mode between CPU and interface; 1.6 basic methods for analyzing and designing interface circuits;

	1.7 development trend of interface technology; **Chapter 2 I / O Port Address Decoding Technology** 2.1 I / O port and its addressing mode; 2.2 I / O port address allocation; 2.3 I / O port address decoding; 2.4 gal device and its application in I / O address decoding **Chapter 3 Timing Counting Technology** 3.1 basic concepts; 3.2 programmable timing / counter 8253-5 / 8254-2; 3.3 application examples of 8253-5 / 8254-2; 3.4 real time clock circuit MC146818 and its application **Chapter 4 DMA Technology** 4.1 characteristics of DMA transmission; 4.2 DMA transfer process; 4.3 DMA transmission mode; 4.4 DMA controller; 4.5 DMA system; 4.6 application of DMA transmission. **Chapter 5 Interrupt Technology** 5.1 basic concept of interruption; 5.2 IBM-PC microcomputer interrupt system; 5.3 Programmable Interrupt Controller 8259A; 5.4 application of 8259A in microcomputer system; **Chapter 6 Memory Interface** 6.1 semiconductor memory; 6.2 memory interface technology; 6.3 main memory interface; 6.4 cache interface Chapter 7 parallel interface 7.1 characteristics of parallel interface; 7.2 structure of parallel interface circuit; 7.3 programmable and
Study and examination requirements and forms of examination	College Computer(Experiment included): written test + computer experiment C Language Programming(Experiment included): written test + computer experiment Python Programming(Experiment included): written test + computer experiment C++ program design(Experiment included): written test + computer experiment JAVA Programming(Experiment included): written test + computer

	experiment Applied Technology of Database(Experiment included): written test + computer experiment Principle and Interface Technology of Microcomputer: written test
Media employed	Projector / blackboard / electronic document / display stand / ppt courseware / laboratory
Reading list	1. ZHI Honglei. Fundamentals of university computer (Windows 7 + Office2010) [M]. Xi'an Jiaotong University Press, August 2016 2. Wang Ning. College computer basic experiment guidance (Windows 7 + Office 2010) [M]. Xi'an Jiaotong University Press, August 2016 3. GAO Jianhua. Basic course of computer application [M]. Shanghai: East China Normal University Press, 2015 4. ZHANG Qing, Yang ziqiao. College computer basic training course [M]. Xi'an Jiaotong University Press, 2014 5. WU Qing. Advanced application of office software [M]. Zhejiang University Press, 2012 6. LIU Daming, Nie Yongping. C language programming [M]. Higher education press, 2012 7. TAN Haoqiang. C programming [M]. Beijing: Tsinghua University Press, 2012 8. LIU Ying, WANG Ning, YANG Xuemei. C language programming [M]. Chongqing University Press, August 2017 9. WANG Shan, SA Shixuan. Introduction to database system [M]. Beijing: Higher Education Press, 2006 10. LI Chunbao. Database principle and Application -- Based on SQL Server 2012 [M]. Beijing: Tsinghua University Press, 2012 11. LI Ping, HUANG Wang, HUANG nenggeng. SQL Server 2012 database application and training [M]. Beijing: China Machine Press, 2015 12. HE Yujie. Database system course (2nd Edition) [M]. Beijing: People's Posts and Telecommunications Press, 2015 13. YUAN Lina, WANG Gang, LUO Qiong. Principle and application of data system (SQL Server 2012) [M]. Beijing: People's Posts and Telecommunications Press, 2015 14.LIU Zhen, Java language programming course, China water resources and Hydropower Press, 2011 15.ZHANG Yueping, Geng Xiangyi, experimental guidance and problem solving of Java 2 practical course (Third Edition), Tsinghua University Press, 2006 16. XIAO Hongbing. Microcomputer principle and interface technology. Beijing: Peking University Press, 2010

	17. Yang Guoxing Introduction to C + + programming [M]. Beijing: China water resources and Hydropower Press, 2020 18. Song Tian. Fundamentals of Python programming [M]. Beijing: Electronic Industry Press, 2021

Module 3 General Understanding of the Major

Module Name	General Understanding of the Major
Module Code	Module 3
Courses name/ Semester(s) in which the module is taught/ Credit points	Survey of the Development of Electronic Information Engineering / 1 / 2ECTS On the new application of electronic technology in life/ 1 / 2ECTS Communication Technology in the Information Age/ 1 / 2ECTS Beidou-Leading the Way of Inquiry/ 1 / 2ECTS
Person responsible for the module（name/professional ranks and titles）	WANG Wei/Associate Professor
Lecturer （name/professional ranks and titles）	LIU Hong / Senior Engineer, ZHANG Yuan / Associate Professor, ZHANG Hui / lecturer, FEI Li / lecturer
Language	chinese
Relation to curriculum	Survey of the Development of Electronic Information Engineering：Compulsory On the new application of electronic technology in life：Elective course Communication Technology in the Information Age：Elective course Beidou-Leading the Way of Inquiry：Elective course
Type of teaching, contact hours	Lecture / discussion / practice / autonomous learning / presentation
Workload	Survey of the Development of Electronic Information Engineering：teaching：60 hours On the new application of electronic technology in life：teaching：60 hours Communication Technology in the Information Age：teaching：60 hours Beidou-Leading the Way of Inquiry：teaching：60 hours
Credit points	4
Requirements according to the examination regulations	Survey of the Development of Electronic Information Engineering：Homework, questioning and usual examination 30%, Course paper 70% On the new application of electronic technology in life：Homework, questioning and usual examination 30%, Course paper 70% Communication Technology in the Information Age：Homework, questioning and usual examination 30%, Course paper 70% Beidou-Leading the Way of Inquiry：Homework, questioning and usual examination 30%, Course paper 70%
Recommended prerequisites	None
Module Objectives/Intended Learning Outcomes	● **ModuleObjectives：** Through the study of professional cognition module, students will understand the development background, knowledge frontier and other related

	knowledge of electronic information engineering; We can Enable students to understand the circuit analysis, digital electronic technology, analog electronic technology and other electronic technology related knowledge involved in this major. We can Enable students to understand signal analysis methods, signal transmission theory, etc., and make students understand the process, links and knowledge of electronic system design. We must also enable students to understand the important role of modern communication technology in daily life and let students understand the working principle of Beidou navigation system and the important role of Beidou navigation system in daily life. Finally, it is important to stimulate students' interest in learning through the learning of this module. ● **Module learning purpose：** After successfully learning this module, students should be able to master the following learning outcomes: 1. Basically understand the methods of learning electronic information engineering, clarify the purpose of learning electronic information engineering, and stimulate interest in learning electronic information engineering; 2. Understand common methods of circuit analysis and common electronic components and instruments; 3. Understand all processes, links and processes of electronic system design; 4. Understand the performance indicators to be met by the electronic system; 5. Master the preliminary ability to deal with practical problems through teamwork 6. Understand the development status and Prospect of electronic information engineering specialty. 7. Understand the role of modern communication technology in daily life; 8. Understand the working principle of Beidou navigation system and its important role in daily life. 9. Improve students' interest in professional learning .
Course Name / Course Objective / Key Knowledge	**Course Name: Survey of the Development of Electronic Information Engineering** **Course Objectives:** Through the study of this course, students can achieve the following objectives: 1. to be familiar with the training program of electronic information engineering; 2. to understand the historical evolution of electronic information engineering, and be familiar with the application of electronic information

	technology in industry, military, aviation life, transportation, etc; 3. to understand the hardware knowledge, software knowledge, signal and information processing knowledge that electronic information engineering majors need to learn; 4. to understand the design process of electronic information system and the software, hardware devices, instruments, etc. to be used. **Key Knowledge ：** 1.Interpretation of talent training scheme for electronic information engineering specialty; 2. History of electronic information technology 3.Sensor technology: basic characteristics of common sensors; Working principle and application of common sensors; 4.Fundamentals of electronic technology: Fundamentals of circuit analysis, analog electronic technology, digital electronic technology, integrated circuit technology and microelectronic system design; 5.Signal analysis and processing technology: purpose and method of signal analysis and processing; Basic mathematical knowledge of signal analysis and processing; Nonlinear and time-varying systems; 6.Information transmission: general model of communication system, analog communication system, digital communication system, multiplexing technology, signal coding, etc; 7.Electronic system design: methods and steps of designing electronic system; Introduction of common design software; Introduction of common devices and main control chips; Application case analysis of electronic system in daily life. **Course Name: On The New Application of Electronic Technology In Life** **Course objectives:** Through the study of this course, students will achieve the following targets： 1.To stimulate students' thirst for knowledge, curiosity and interest in learning through the analysis of application cases. 2.Through the introduction of the structure of typical electronic system, combined with the practical application to elicit the content of the seminar, students can summarize the basic structure of electronic system and the functions of each module by the necessary explanation. Let students acquire the necessary basic knowledge and technology, and establish the ability of correct understanding, theoretical analysis and problem-solving. 3．To obtain the necessary basic knowledge by searching for materials outside class, and make use of the existing practice conditions to carry out relevant practice activities, in order to cultivate and improve students' experimental

	hands-on ability, and promote students to understand basic knowledge and technology. 4. To guide students to actively participate in various practical activities by group discussing, topic selecting, design scheme programming, carrying out reserch, discussion of outline writing and report designing. And to cultivate students to understand professionalism in concepts, understand problem-solving ideas in methods, and have certain innovative capabilities 5. Through the research inside and outside the class to obtain the research results. Then, make the research report into a PPT document and respond in class, in order to cultivate the students' ability to "ask questions, explore questions, answer questions and retain questions", so as to lay a foundation for follow-up learning and further study. **Key Knowledge：** **Chapter 1 Introduce The New Applications of Electronic Technology In The Intelligent Era** 1. The cose feeling of intelligence age 2. Understanding the new technologies in the intelligent age 3. Applying analysis and proposal of research tasks **Chapter 2 New Application of Electronic Technology In Smart City** 1. The concept of smart city 2. International application practice 3. Domestic status analysis and research tasks **Chapter 3 New Application of Electronic Technology In Smart Home** 1. The concept of smart home 2. Key technology analysis of smart home 3. Application analysis and research tasks **Chapter 4 New Applications of Electronic Technology In Smart Agriculture** 1. The concept and key technology analysis of smart agriculture 2. Application scenario analysis and discussion tasks **Chapter 5 New Application of Electronic Technology In Intelligent Vehicle And Intelligent Management System** 1. The concept of smart car 2. Key technologies and implementation of smart car 3. Concept and key technology of intelligent management system 4. Development of global driverless Intelligent Vehicle Technology 5. Application scenario analysis and discussion tasks **Chapter 6 New Applications of Electronic Technology For Intelligent Robots And In Future Life** 1. The concept of intelligent robot

	2. Key technologies and implementation of intelligent robot 3. Application scenario analysis and discussion tasks in future life **Chapter 7 Classroom Practice - Design Of Automatic Tracking Car** 1. Discuss in groups and draw up the design scheme 2. Purchase equipment and build circuits 3. Test analysis and summary report **Course Name: On Communication Technology in the Information Age** **Course objectives:** Through the study of this course, students can achieve the following objectives: 1. to understand the knowledge framework of communication and information systems. 2. to learn more about electronic information majors. 3. to better understand the application of modern communication technology. 4. Modern communication technology to be mastered by electronic and information talents. 5. to stimulate students' interest in learning. 6. to guide students to adapt to university study as soon as possible. **Key Knowledge :** **Chapter 1 Preliminary Understanding of Electronic Information Specialty** 1. Current situation of electronic information industry 2. The role of electronic information industry 3. Development direction of electronic information technology **Chapter 2 Famous Figures In The Field of Electronic Information** 1. Introduction to representatives in the field of modern electronic information 2. Introduction to well-known enterprises in the field of modern electronic information **Chapter 3 Digital Technology And Informatization** 1. Digital technology 2. Informatization 3. Digitization **Chapter 4 Thematic Discussion: Talking About Communication Technology In Life** **Chapter 5 Communication Technology And Information Terminal** 1. Classification of communication technologies 2. Development of communication terminals **Chapter 6 New And Popular Modern Communication Technologies**

	1. Mobile communication 5g 2. Internet of things NB IOT 3. Artificial intelligence 4. Big data 5. Information security **Chapter 7 Visit Communication And Electronic Information Technology System Equipment** **Course Name: Beidou-Leading the Way of Inquiry** **Course objectives:** Through the study of this course, students can achieve the following objectives: 1. to understand the basic principles of Beidou Positioning and navigation; 2. to understand the relationship between Beidou time service and communication synchronization; 3. to understand the differences between Beidou and European Galileo positioning and navigation systems; 4. to cultivate students' interest in learning, improve their ability to analyze and solve problems, and lay a solid foundation for subsequent courses **Key Knowledge** : 1. Beidou and Sinan 2. Satellites and Rockets; 3. Communication and navigation; 4. Timing and synchronization; 5. Track and calculation; 6. Spectrum and bandwidth
Examination requirements and examination form	Survey of the Development of Electronic Information Engineering：Course paper On the new application of electronic technology in life：Course paper Communication Technology in the Information Age：Course paper Beidou-Leading the Way of Inquiry：Course paper
Media Employed	Projector / blackboard / electronic document / display stand / ppt courseware
Reading List	YANG Jie, introduction to electronic information engineering [M], electronic industry press, December 2019 YEShujiang, LIUHaicheng. Introduction to electronic information engineering [M]. China Electric Power Publishing House, June 2017

Module 4 Fundamentals of Electronic Technology

Module name	Fundamentals of Electronic Technology
Module code	Module 4
Courses name / Semester(s) in which moduel is taught / Credit points	Basics of Circuit Analysis(including Experiment) / 1 / 4.5ECTS Basics of Electronic Circuits(including Experiment) / 2 / 4.5 ECTS Digital circuit and logic design (including experiment) / 3 / 4.5 ECTS Communication electronic circuit (including experiment) / 4 / 4.5 ECTS Integrated Design of Electronic Technology Course / 5 / 1 ECTS
Person responsible for the module(name/professional ranks and titles)	ZHANG Yuan / Associate Professor
Lecturer (name/professional ranks and titles)	TANG linjian / Associate Professor, LI Weidong / Associate Professor, XU Xiao / Associate Professor, YUAN LIN / Associate Professor, GOU Bingyong / Associate Professor, TANG Yan / Associate Professor, WANG Guoshu / Senior Engineer, DENG Juan / lecturer, ZHANG Hui / lecturer
Language	Chinese
Relation to Curriculum	Basics of Circuit Analysis(including Experiment): compulsory Basics of Electronic Circuits(including Experiment): compulsory Digital circuit and logic design (including Experiment): compulsory Communication electronic circuit(including Experiment): compulsory Integrated Design of Electronic Technology Course: compulsory
Type of Teaching	Lecture / discussion / practice / autonomous learning / demonstration / experiment
Workload	Basics of Circuit Analysis(including Experiment): Teaching: 135 hours Basics of Electronic Circuits(including Experiment): Teaching: 135 hours Digital Circuit and Logic Design(including Experiment): Teaching: 135 hours Communication Electronic Circuit(including Experiment): Teaching: 135 hours Integrated Design of Electronic Technology Course: Teaching: 30 hours
Credit points	18 ECTS
Requirements according to the examination regulations	Basics of Circuit Analysis(including Experiment): assignments, questions and usual inspections account for 20%, experiments account for 20%, and final exams account for 60%. Basics of Electronic Circuits(including Experiment): homework, questions and usual inspection account for 20%, experiments account for 20%, and final exams account for 60%. Digital Circuit and Logic Design(including Experiment): homework, questions and usual inspection account for 20%, experiment accounts for 20%, and final examination accounts for 60%. Communication Electronic Circuit(including Experiment): homework, questions and usual inspection account for 40%, and final examination

	accounts for 60%. Integrated Design of Electronic Technology Course: operation, routine inspection account for 40%, and course report accounts for 60%.
Recommended prerequisites	Programming of university computer and C language
Module Objectives/Intended Learning Outcomes	● **Module Objectives:** This module aims to enable students to master the basic knowledge of circuit analysis, electronic circuits, digital circuit and logic design, communication electronic circuit and integrated design of electronic technology course, so as to lay a solid foundation for learning professional application courses. Enable students to have the ability to analyze, calculate and design various circuits; master various theoretical analysis methods of signals and systems; be able to analyze the function realization mechanism of components and have the ability of corresponding design, debugging and maintenance. They will apply relevant knowledge to develop and design a simple application system. ● **Module Intended Learning Outcomes:** Students have the basic characteristics and abilities expected of a junior network engineer after learning the subsequent advanced courses modules based on this module. Students should be able to demonstrate the following learning outcomes: 1. Develope a curiosity and interest in the analysis and design of engineering circuits; 2. Master the decomposition, superposition and transformation methods of engineering circuit analysis; 3. Understand the basic concepts of amplification, feedback and power amplification in analog electronic circuit, be familiar with the composition principle of the basic application circuit of operational amplifier, and the composition principle of series type and switch type DC voltage regulator circuits; 4. Be able to conceive, design, implement and run low difficulty analog electronic circuits; 5. Master the basic methods of analyzing digital electronic circuits by using the tools of truth table, Carnot diagram, logic diagram, logic expression and state conversion diagram and the design method of combined logic circuits; 6. Master the characteristics of basic RS trigger, JK Trigger, D-type trigger and T-type trigger, and be able to design the timing logic circuits with low difficulty by using these triggers; 7. Understand the communication system model, the time-domain characteristics and frequency-domain characteristics of data signals, and

	master the basic methods of data signal transmission. 8. Master the principles of binary digital modulation , understand the meaning of channel capacity and Shannon formula, and be familiar with several commonly used error control codes. 9. Understand the concept of data link, the main functions of data link transmission control procedures, and understand the packet exchange mode of data. 10. Be able to use computer-aided software to design analog electronic circuit and digital electronic circuit and manufacture simple electronic products. 11. Be able to use computer-aided software to simulate and design communication units.
Course name / course objectives /Key knowledge	**Course Name: Basics of Circuit Analysis**(Including Experiment) **Course Objectives:** Through the study of this course, students can achieve the following objectives: 1. Through the study of this course, students can grasp the basic concepts, basic theories and analysis methods of circuit firmly in terms of content; 2. In terms of competence, students will have some hands-on skills and improve their level of integrating theory with practice; 3.In terms of teaching methods, the basic concepts, basic theories and basic analysis methods of circuits are emphasized, and the combination of theory and practical problems is emphasized; 4. Through a large number of specific circuit analysis and practice, students can deepen their understanding of theoretical methods and have the ability to initially apply theoretical knowledge to solve general practical engineering problems. **Key Knowledge:** **Part I Theoretical Knowledge:** **Chapter 1 Basic concepts and basic laws of circuits** 1. Circuit and circuit model 2. Basic variables of circuit analysis 3. Kirchhoff's law 4. Resistance element, ideal power supply, controlled source 5. The concept and calculation of potential in circuit **Chapter 2 Equivalent transformation of circuit** 1. The concept of single port circuit equivalence 2.Two circuit models of actual power supply and their equivalent transformation 3.Equivalent simplification and calculation of passive and source-containing single port networks **Chapter 3 Basic analysis method and circuit theorem of linear resistance**

	circuits 1. Branch current method and substitution theorem 2. Analysis of linear circuits with controlled sources 3. Node analysis, loop analysis, superposition theorem, Thevenin's theorem and Norton's theorem **Chapter 4 Time Domain Analysis Of Dynamic Circuit** 1. Capacitor and inductor 2. The law of switching and the calculation of initial values 3. Concepts of zero input response, zero state response and total response and decomposition of total response 4. The three-element method of DC first order circuit **Chapter 5 Sinusoidal Steady-State Circuits Analysis** 1. Sinusoidal signal and related concepts 2. Phase volume representation of sinusoidal signal 3. The concept of impedance and admittance 4. Phase form and phase model of resistor, inductor and capacitor 5. Phasor form of Kirchhoff's law 6. Maximum power transmission theorem **Chapter 6 Coupling Inductance And Ideal Transformer** 1. Concepts of coupling inductance, coupling coefficient and mutual inductance 2. Definition of homonymous terminal and volt ampere characteristics of coupling inductor 3. Decoupling equivalent circuit of coupled inductor 4. Circuit model of an ideal transformer 5. Voltage, current and impedance characteristics 6. Decoupling equivalent analysis of circuits with coupled inductors 7. Analysis of circuit with ideal transformer **Chapter 7 Frequency Characteristics of Circuits** 1. Amplitude frequency characteristic and phase frequency characteristic of RC circuit 2. Definition of the network function of a sinusoidal steady-state circuit and the concepts of amplitude-frequency and phase-frequency characteristics 3. RLC series resonant circuit 4. RLC parallel resonant circuit **Part II Course Experiment:** 1. Mapping of volt ampere characteristics of circuit components 2. Experimental study on controlled source 3. Verification of superposition principle 4. Verification of Thevenin's theorem

	Course Name: Basics of Electronic Circuits (Including Experiment) **Course objectives:** Through the study of this course, students can achieve the following objectives: 1. Understand the development and application prospects of analog electronic technology, and deeply understand the importance of electronic technology to the development of national science and technology. Familiar with the characteristics, functions and functions of various electronic components and can use them to complete various related functions. 2. Master the characteristics and functions of various typical circuits and use them correctly; Can consult data according to the requirements and realize the design scheme. 3. Master the AC and DC analysis methods of amplifier circuit, calculate the main parameters of basic circuit, and understand the analysis method of basic amplifier circuit. 4. Have the ability to apply electronic circuit thermal knowledge to solve practical problems of general engineering in the initial stage, and have the ability of electronic system design, analysis, improvement and optimization. 5. Master the basic working principle and correct operation method of common electrical instruments (such as DC voltage stabilized power supply, multimeter, function signal generator, dual trace oscilloscope and AC millivolt meter). 6. Be able to identify, judge and use various semiconductor components correctly(such as pnp/npn triode, integrated operational amplifier, etc.), master the working principle of its circuit and the debugging and detection method of circuit parameters. 7. Master the frequency characteristics and test methods of various basic circuits. 8. Be able to identify the causes of errors in measurement data, and have some ability to analyse measurement errors and process measurement data, and be able to write experimental reports independently, with in-depth theoretical analysis, detailed data, fluent text and standardised diagrams. 9. Establish self-confidence in in-depth learning and have the ability to learn and adapt to development constantly; Good expression ability, communication ability and interpersonal ability. **Key Knowledge ：** **Part I Theoretical Knowledge:** **Chapter 1 Semiconductor Diode And Its Application Circuit** 1. Basic knowledge of semiconductor 2. Formation and characteristics of PN junction

	3. Semiconductor diode 4. Analysis of nonlinear circuit 5. Special diode **Chapter 2 Bipolar Transistor And Its Basic Amplifier Circuit** 1. Transistor and its characteristics 2. Main performance of amplifier circuit 3. Characteristics of amplification circuit 4. Diagrammatic analysis of amplifying circuit 5. Equivalent circuit method of amplifying circuit 6. Operating point stable common-source amplification circuits 7. Common set and common base basic amplifier circuit **Chapter 3 Field Effect Tube And Its Amplifying Circuit** 1. Type of field effect tube and junction type field effect tube 2. Insulated gate type field effect tube 3. Comparison of the characteristics of various field effect tubes 4. Main parameters of field effect tube and equivalent model of small signal 5. Common source and common leakage basic amplifier circuit **Chapter 4 Multi-Stage Amplifier Circuit And Frequency Response** 1. Multi stage amplifier circuit 2. Composition block diagram and circuit symbol of integrated operational amplifier 3. Frequency response of amplification circuit 4. Equivalent model of high frequency and small signal of transistor **Chapter 5 Feedback In Amplifier Circuit** 1. Basic concept of feedback 2. Four kinds of resistance states of AC negative feedback amplifier circuit 3. The influence of negative feedback on the performance of amplifier circuit 4. Analysis and calculation of deep negative feedback amplifier circuit 5. Stability of negative feedback amplifier circuit **Chapter 6 Power Amplifier Circuit** 1. Basic requirements and classification of power amplifier circuit 2. OCL complementary symmetrical power amplifier circuit 3. OTL complementary symmetrical power amplifier circuit 4. Composite tube and its quasi complementary symmetrical power amplifier circuit **Chapter 7 Integrated Operation Amplifier Circuit** 1. Circuit characteristics of integrated operational amplifier 2. Current source circuit in integrated circuit 3. Basic differential amplifier circuit and its characteristics 4. Long tail differential amplifier circuit

	Chapter 8 Basic Application Of Integrated Operational Amplifier Circuit 1. Analysis method of ideal integrated operational amplifier 2. Proportional operation circuit 3. Add and subtract operation circuit 4. Integral and differential operation circuit 5. Exponential and logarithmic operation circuit 6. Voltage comparator **Chapter 9 DC Power Supply** 1. Composition of DC power supply 2. Single phase rectifier circuit 3. Filter circuit 4. Voltage stabilizing circuit **Part II Course Experiment:** 1. Transistor common emitter single tube amplifier 2. Emitter follower 3. Differential amplifier 4. Basic application of integrated operational amplifier 1 5. Basic application of integrated operational amplifier 2 6. Negative feedback amplifier 7. RC frequency selective network oscillator **Course name: Digital Circuit and Logic Design** (Including Experiment) **Course Objectives:** Through the study of this course, students can achieve the following objectives: 1. Through the study of this course, students should firmly master the conversion of various decimal numbers; The coding commonly used in digital system; The basic formula, theorem and operation rules of logic algebra; The simplification method of logic function; The analysis and design methods of medium and small scale combined logic circuits and sequential logic circuits. To understand the functions and applications of common pulse unit circuits composed of common integrated logic devices, programmable logic devices, memory and 555 timer; 2. Be able to identify and consult manual data of various small and medium-sized digital logic integrated circuits (such as TTL54/74 series, CMOS4000 series and other devices), master the working principle and logic test method of integrated circuits; To understand all kinds of digital integrated circuits and preliminarily master the methods of selecting circuit devices to design electronic circuits; Master the basic elements of digital signal and the

	correct measurement method of duty cycle; Master the correct connection of the instrument in the measuring circuit and the influence on the circuit under test. The influence of test method on measurement results can be considered; Have the ability of preliminary digital logic analysis and logic circuit fault handling, and learn to judge the causes of errors in logical measurement; Can write the experiment report independently, the theoretical analysis of the experimental report is in-depth, the data is detailed, the text is smooth, and the chart is standardized; 3. Have the ability to apply theoretical knowledge to solve the practical problems of general engineering at the early stage. **Key Knowledge：** **Part I Theoretical Knowledge:** **Chapter 1 Digital Logic Basis** 1. Number system and coding 2. Logic algebra 3. Basic formula, common formula and three rules of logic algebra 4. Representation of logical function and its simplification **Chapter 2 Logic Gate Circuit** 1. Basic logic gate circuit 2. TTL integrated logic gate 3. MOS integrated door **Chapter 3 Combined Logic Circuit** 1. Analysis and design of small scale combined logic circuit 2. Scale integrated circuit in common combinational logic **Chapter 4 Integrated Trigger** 1. Basic RS trigger 2. Clock controlled trigger 3. Master slave JK Trigger 4. Edge trigger **Chapter 5 Sequential Logic Circuit** 1. General 2. Analysis of sequential logic circuit 3. Design of sequential logic circuit **Chapter 6 Semiconductor Memory And Programmable Logic Devices** 1. Semiconductor memory 2. Programmable logic device **Chapter 7 Pulse Unit Circuit** 1. Overview 2. Schmidt trigger

	3. Monostable trigger 4. Multivibrator **Part II Course experiment:** 1. Adder 2. Decoder 3. Clock controlled trigger 4. Counter and its application **Course Name: Communication Electronic Circuit** (Including Experiment) **Course objectives:** Through the study of this course, students can achieve the following objectives: 1. Through the study of this course, students are required to master the basic concepts and basic theories of communication electronic circuits; 2. Master the working principle, analysis method and application of high frequency small signal resonant amplifier circuit, resonant power amplifier circuit, sine wave oscillation circuit, amplitude modulation, demodulation and mixing circuit, angle modulation and demodulation circuit and feedback control circuit; 3. Master the analysis method of simple circuit, have a certain ability to read circuit, and have the ability to analyze and solve specific problems. **Key Knowledge：** **Part I Theoretical Knowledge:** **Chapter 1 Introduction** 1. Brief history of radio communication development 2. Basic composition and related concepts of radio communication system 3. Spectrum and modulation characteristics of signal **Chapter 2 High Frequency Small Signal Resonant Amplifier** 1. Characteristics of components (capacitance, resistance, inductance, etc.) in high frequency circuits 2. The frequency selection characteristics of LC circuit, impedance conversion circuit, tap parallel oscillation circuit and quartz crystal resonator 3. Working principle, performance analysis, stability and multistage resonant amplifier of high frequency small signal resonant amplifier 4. Source and characteristics of electronic noise **Chapter 3 High Frequency Power Amplifier** 1. Working principle, working state and external characteristics of class C high frequency power amplifier 2. Actual line of high frequency power amplifier

	3. Broadband high frequency amplifier, power synthesis and RF module amplifier **Chapter 4 Sine Wave Oscillation Circuit** 1. Working principle, balance condition, starting condition and stability condition of feedback oscillator 2. The principle of LC oscillator, capacitor feedback oscillator, inductor feedback oscillator and two improved capacitor feedback oscillators 3. Working principle of quartz crystal oscillator **Chapter 5 Amplitude Modulation, Demodulation And Mixing** 1. Amplitude modulation principle and its characteristics (AM wave, DSB wave, SSB wave) 2. Demodulation method of amplitude modulation signal, peak envelope detector of diode and synchronous detection circuit 3. Interference of mixing, mixing circuit and mixer **Chapter 6 Angle Modulation And Demodulation** 1. Characteristics of FM signal (comparison of parameters with waveform, spectrum, bandwidth, power, FM wave and phase modulation wave) 2. Frequency regulator, frequency modulation method and frequency modulation circuit 3. Frequency discrimination method and frequency discriminating circuit **Chapter 7 Feedback Control Circuit** 1. Working principle of automatic gain control circuit, performance index of control circuit and AGC 2. The composition and basic working principle of PLL, and the typical application of PLL 3. New technology of modern wireless communication circuit **Part II Course experiment:** 1. Overview and high frequency small signal tuning amplifier 2. LC and crystal oscillator experiment 3. Amplitude modulation and diode inspection experiment 4. Frequency modulation and orthogonal frequency discrimination experiment 5. Digital phase locked loop experiment 6. Experiment of analog multiplication mixer **Course Name: Integrated Design of Electronic Technology Course** **Course Objectives:** Through the study of this course, students can achieve the following objectives: Through the comprehensive training of electronic technology curriculum

	design, students can deepen their understanding of the basic theory of electronic technology. Through the design process, students are trained in design ideas, design skills, debugging skills and experimental research skills, and at the same time, it is conducive to improve students' self-study ability and the ability to use basic theory to solve practical engineering problems, It lays a solid foundation for the design of electronic technology system. **Key Knowledge：** 1. Working principle of bridge rectifier circuit; 2. Working principle of three-end voltage regulator and series type voltage stabilizing circuit; 3. 555 timer and multi vibrator working principle; 4. Function and usage of shift register 74LS194; 5. Function and application method of 3-8-line decoder 74LS138; 6. Function and usage of counter 74LS160; 7. Construction and test of color lamp control circuit.
Study and examination requirements and forms of examination	Basics of Circuit Analysis(Including Experiment): written test + experimental report Basics of Electronic Circuits(Including Experiment): written test + experimental report Digital Circuit and Logic Design(Including Experiment): written test + experimental report Communication Electronic Circuit: written test + experimental report Integrated Design of Electronic Technology Course:Experimental Report
Media employed	Projector / blackboard / electronic document / display stand / ppt courseware/laboratory
Reading list	1. CHEN Daqin. Fundamentals of analog electronic technology [M]. Beijing: mechanical and electronic industry press, 2010. 2. TONG Shibai. Fundamentals of Analog Electronic Technology (4th Edition) [M]. Beijing: Higher Education Press, 2008. 3. ZHANG Yuan. Low frequency electronic circuit [M]. Xi'an: Xi'an University of Electronic Science and Technology Press, 2017. 4. KANG Guanghua. Fundamentals of Electronic Technology (simulation) [M]. Beijing: Higher Education Press, 2006. 5. ZHU Dinghua. Digital circuit and logic design [M]. Beijing: Tsinghua University Press. 2011. 6. OUYANG Xingming. Digital circuit logic design [M]. Beijing: People's Posts and Telecommunications Press. 2011. 7. ZHU Zhengwei. Digital circuit logic design (third Edition) [M]. Beijing: Tsinghua University Press, 2017. 8. ZHANG Suwen. High frequency electronic circuits (Fifth Edition) [M]. Beijing: Higher Education Press, May 2009.

	9. XIE jiakui. Electronic circuit (nonlinear part) (Fourth Edition) [M]. Beijing: Higher Education Press, May 2000. 11. LI Weidong. Communication electronic circuit [M]. Xi'an: Xi'an University of Electronic Science and Technology Press, August 2017.

Module 5 Fundamentals of Signal Processing Technology

Module name	Fundamentals of Signal Processing Technology
Module number	Module 5
Course name / semester / credit	Signal and System (Experiment included) / 4 / 4.5 ECTS Digital Signal Processing (Experiment included) / 5 / 4.5 ECTS Information Theory and Coding/ 6/ 4ECTS
Person responsible for the module (name/professional ranks and titles)	Tian Li /Associate Professor
Lecturer (name/professional ranks and titles)	Tian Li / Associate Professor, He Chunyan / Associate Professor, Lu / lecturer, Fei Li / lecturer, Yang Huiping / lecturer, Huang Ying / lecturer
Teaching language	Chinese
Course attribute	Signal and System (Experiment included): compulsory Digital Signal Processing (Experiment included): compulsory Information Theory and Coding: compulsory
Teaching methods	Lecture / discussion / practice / autonomous learning / demonstration / experiment
Workload	Signal and System (Experiment included): Teaching: 135 hours Digital Signal Processing (Experiment included): Teaching: 135 hours Information Theory and Coding: Teaching: 120 hours
Credit point	13
Assessment method	Signal and System (Experiment included): homework, questioning and usual inspection account for 20%, experiment 20% and final examination 60% Digital Signal Processing (Experiment included): homework, questioning and usual inspection account for 20%, experiment 20% and final examination 60% Information Theory and Coding: homework, questions and usual checks account for 40%, and final exams account for 60%
Prerequisite courses	Advanced Mathematics, Fundamentals of Circuit Analysis, Fundamentals of Electronic Circuit
Module course objectives /Intended learning outcomes	● **Module Objectives：** After learning this module, students will master the basic theory of signal processing and understand the time-domain analysis method and frequency-domain analysis method of signals, grasp the characteristics of time invariant systems, master the characteristics and design methods of various common filters, and master common coding techniques. Students can also have preliminary engineering practice and application innovation ability. ● **Module Learning Purpose：** Upon successful learning of this module, students should be able to

	demonstrate the following learning outcomes: 1. Master the time domain analysis method and frequency domain analysis method of signal; 2. Master the advantages of digital signal processing; 3. Master the design of digital filter; 4. Master coding theory.
Course name / course objectives /Key knowledge	**Course Name: Signal and System (Experiment included)** **Course Objectives:** Through the study of this course, students can achieve the following objectives: Grasp the basic theories and basic analysis methods of signal and linear non-time-varying system, master the most basic signal transformation theory and analysis methods of linear non-time-varying system, and lay a solid theoretical foundation for learning follow-up courses and engaging in engineering technology and scientific research in related fields. Through the study of this course, students can master the basic theory and basic analysis methods of signal and system, and ability to flexibly use theoretical knowledge to analyze and solve practical problems can be cultivated. **Key Knowledge ：** **(1) Signal and System Overview** Mathematical expressions, waveforms and characteristics of commonly used typical signals; Properties of unit impulse signal; Basic operations of signal (especially translation, inflection, companding and differential operations); System classification and judgment method; Time domain simulation block diagram of continuous system and discrete system. **(2) Time Domain Analysis of LTI System** The concepts and calculation methods of unit impulse response, unit step response, unit sequence response and unit step sequence response; Calculation and properties of convolution; Calculation and properties of convolution sum. **(3) Frequency Domain Analysis of Signal and System** Fourier series of continuous periodic signal; Spectrum of continuous periodic signal; Fourier transform and its properties; Frequency domain analysis of LTI continuous system; Sampling theorem. **(4) Complex Frequency Domain Analysis of Continuous Signals and Systems** The definition and properties of Laplace transform; The inverse Laplace transform is solved by partial fraction expansion method; Complex frequency domain analysis method of LTI continuous system; Solution of system function H (s); A method for judging the stability of LTI continuous systems.

(5) Z-domain Analysis of Discrete Signals and Systems

Definition and properties of Z transformation; Using the partial fraction expansion method to solve the Z inverse transformation; Z-transform analysis method of LTI continuous system; Solution of system function H (z); Identification of stability of LTI causal discrete systems.

Course Name: Digital Signal Processing (Experiment included)

Course Objectives:

Through the study of this course, students can achieve the following objectives:

Discuss the main basic knowledge of digital signal processing theory and technology: the basic concept and analysis method of time-domain discrete signal and system, discrete Fourier transform, fast Fourier transform, the basic design method of digital filter and so on; Establish the basic concept of "digital signal processing", master the basic analysis methods and tools of digital signal processing, and build a solid foundation for research work in communication, information or signal processing. In addition, students are able to systematically master the basic principles and analysis methods of digital signal processing, establish the basic digital signal processing model, use the two main tools of digital signal processing: Fast Fourier transform and digital filter, and build a solid theoretical foundation for the study of subsequent courses in digital technology.

Key Knowledge:

1. Introduction

Characteristics of digital signal processing, theory, implementation technology and application of digital signal

2. Time Domain Discrete Signal and Time Domain Discrete System

Seven common sequences and their operation rules, determination of time invariant and causal stability of time-domain discrete systems, convolution operation and solution of difference equations

3. Frequency Domain Analysis of Time Domain Discrete Signals and Systems

Definition and properties of Fourier transform; Z transformation, Z inverse transformation and property theorem of sequences

4. Discrete Fourier Transform (DFT)

The definition and physical meaning of discrete Fourier transform, and the basic properties of discrete Fourier transform

5. Fast Fourier Transform (FFT)

The concept of fast Fourier transform.

6. Network Structure of Time Domain Discrete System

Basic network structure of IIR system and FIR system

7. Design of IIR Digital Filter

Basic concept of digital filter and design of analog filter

8. Design of FIR Digital Filter

The conditions and characteristics of linear phase FIR digital filter and the design of FIR filter by window function method

Course Name: Information Theory and Coding

Course Objectives:

Through the study of this course, students can achieve the following objectives:

1. Master source description and classification, information entropy, mutual information and redundancy of discrete and continuous sources;
2. Master the relationship between entropy and mutual information;
3. Master the basic concept of channel, discrete single symbol, sequence channel and its capacity, continuous channel and its capacity, and the matching between source and channel;
4. Master distortion free source coding theory and distortion Limited source coding theory;
5. Master Shannon code, FeNO code, Huffman code and LZ code;
6. Master the coding theorem of disturbed discrete channel, the basic principle and analysis method of error correction coding and decoding;

Master linear block codes and convolutional codes;

7. Have the ability to initially apply theoretical knowledge to solve general engineering practical problems

Key Knowledge:

Chapter 1 Information Source and Information Entropy

1. Description and classification of information sources
2. Discrete source entropy and mutual information
3. Continuous source entropy and mutual information
4. Redundancy of source

Chapter 2 Channel and Channel Capacity

1. Basic concept of channel
2. Discrete single symbol channel and its capacity
3. Continuous channel and its capacity

Chapter 3 Information Rate Distortion Function

1. Concept and properties of information distortion function
2. Calculation of discrete source R (d)

Chapter 4 Source Coding

	1. Concept of coding 2. Distortion free source coding theorem 3. Distortion limited coding theorem 4. Shannon code, FeNO code and Huffman code **Chapter 5 Channel Coding** 1. Classification of errors and error control systems 2. Vector space and code space 3. Channel coding theorem 4. Basic idea of error correction coding 5. Decoding method 6. Generation matrix and check matrix of linear block code 7. Adjoint and standard array decoding 8. Basic probability and description method of convolutional code 9. Maximum likelihood decoding of convolutional codes
Examination requirements and forms	Signal and System (Experiment included): written test + experimental report Digital Signal Processing (Experiment included): written test + experimental report Information Theory and Coding: written test
Teaching aids	Projector / blackboard / electronic document / display stand / ppt courseware/laboratory
Reading list	1. Yang, X., & He, F. (2014). *Signal and system* (2nd ed.). Beijing: Science Press. 2. Shen, Y., & Zhou, J. (2009). *Signal and system* (2nd ed.). Beijing: People's Posts and Telecommunications Press. 3. Zheng, J. (2011). *Signal and system* (3rd ed.). Beijing: Higher Education Press. 4. Gao, X., & Ding, Y. (2001) *Learning guide for digital signal processing* (2nd ed.). Xi'an University of Electronic Science and Technology Press. 5 Cheng, P. (2001) *Digital signal processing course*. Tsinghua University Press. 6 Oppenheim, A.V., Schaeffer, R.W., & Buck J.R. (2001). *Discrete time signal processing* (2nd ed.). (Liu S., & Huang, J., Trans.). Xi'an Jiaotong University Press. 7. Cao, X. (2016). *Information theory and coding*. Beijing: Tsinghua University Press. 8. Feng, G. (2016) *Information theory and coding*. Beijing: Tsinghua University Press. 9 Fu, Z. (2014). *Information theory and coding*. Beijing: Electronic Industry Press.

Module 6 Fundamentals of Information Transmission Technology

Module name	Fundamentals of Information Transmission Technology
Module number	Module 6
Course name / semester / credit	Electromagnetic Field And Wave / 5 / 4 ECTS Communication Principle / 5 / 4 ECTS Basic Experiment of Communication Technology / 5 / 1 ECTS Modern Network Technology (Experiment included) / 6 / 4 ECTS Principle And Technology of Mobile Communication / 7/ 4ECTS
The person responsible for the module (name/professional ranks and titles)	JIANG Qing / Professor
Lecturer(name/professional ranks and titles)	LIU Hong / Senior Engineer, FENG Wenguo / Senior Engineer, DONG Niya / Senior Engineer, ZHANG Hui / Lecturer, CHEN Yun / Lecturer, FEI Li / Lecturer, YANG Huiping / Lecturer, HUANG Ying / Lecturer, PENG Hong / Assistant
Teaching language	Chinese
Course attributions	Electromagnetic Fields and Waves: compulsory Communication Principle: compulsory Basic Experiment of Communication Technology: compulsory Modern Network Technology (Experiment included): compulsory Mobile Communication Principle And Technology: compulsory
Teaching methods	Lecture / discussion / practice / autonomous learning / demonstration / experiment
Workloads	Electromagnetic field and wave: Teaching: 120 hours Communication principle: Teaching: 120 hours Basic experiment of communication technology: 30 hours Modern network technology (Experiment included): 120 hours Principle and technology of mobile communication: 120 hours
Credit points	17
Assessment methods	Electromagnetic field and wave: 40% for homework, questions and usual inspection, and 60% for final examination. Communication principle: 40% for homework, questioning and usual inspection, and 60% for final examination. Basic experiment of communication technology: 20% for the attendance and 80% for experiments. Modern network technology (Experiment included): 20% for homework, questioning and usual inspection, 20% for experiment, and 60% for final examination. Mobile communication principle and technology: 40% for homework,

	questions and usual inspection account, and 60% for final examination.
Prerequisite courses	Advanced Mathematics, College Physics, Signal and System, Computer Foundation
Module course objectives /Intended Learning Outcomes	● **Module Objectives：** After learning this module, students will master the basic theory of information transmission; the communication principle and the modern network technology; the theory of electromagnetic wave transmission; and the basic principles of mobile communication. And the students will possess the ability to engineering practice and innovate in engineering. ● **Module learning purpose：** After the successful learning of this module, students should be able to demonstrate the following learning outcomes: 1. To master the basic concepts of communication and communication system, be familiar with the implementation principle of each part of communication system and the basic method of performance analysis and calculation, and be able to verify it through experiments; 2. To master the constituent elements of communication network and the implementation principle of various typical communication networks, and be able to master the concept, mechanism and relationship of various communication technologies from the perspective of the whole process and the whole network; 3. To master the knowledge structure and content system of science and technology with practicality, integrity and advanced nature from the perspective of network integration. 4. To have a systematic and clear understanding of the transmission principle and transmission characteristics of various transmission media. 5. To master the relevant theoretical knowledge, basic implementation principle and key technology of mobile communication, as well as the current hot mobile communication system implementation technology and its development trend.
Course name / Course objectives /Key knowledge	**Course Name: Electromagnetic Field and Wave** **Course objectives:** Through the study of this course, students can achieve the following objectives: To master the basic laws of electromagnetic fields, explain the physical meaning of Maxwell's equations, and be able to calculate the electric and magnetic field strengths in electrostatic fields, constant-current electric fields and constant-current magnetic fields; master the propagation characteristics of radio waves, and be able to choose different communication systems according to the propagation mode of radio waves, be able to solve the signal

	fading; learn the principles and electrical parameters of basic oscillator antennas, and have the basic ability to analyze commonly used antennas; understand the types of antennas, the selection, the selection of common antennas and be able to practice.. **Key Knowledge points:** **Chapter 1 Vector analysis** 1. Three commonly used coordinate systems 2. Calculus of vector function 3. The gradient of a scalar function 4. Divergence of vector function 5. Curl of vector function **Chapter 2 Basic Electromagnetic Field Equations** 1. Maxwell equations 2. Boundary conditions of electromagnetic fields 3. The complex representation of the time-harmonic electromagnetic field 4. Poynting theorem 5. Bit function of electromagnetic field **Chapter 3 Plane Electromagnetic Wave** 1. Uniform plane wave in ideal medium 2. Polarization of uniform plane wave 3. Uniform plane wave in lossy medium 4. The normal incidence of a uniform plane wave on the plane boundary 5. Oblique incidence of a uniform plane wave on the plane boundary **Chapter 4 Antenna basics** 1. Introduction 2. Radiation from the fundamental oscillator 3. The electrical parameters of the transmitting antenna 4. The reciprocity theorem and the electrical parameters of the receiving antenna 5. Symmetrical vibrator 6. The directivity of the antenna array **Chapter 5 Simple Wire Antenna** 1. Introduction 2. Horizontally symmetrical antenna 3. Upright antenna 4. Lead to the antenna **Chapter 6 Radio Wave Propagation** 1. Introduction 2. Free space radio wave propagation 3. Ground wave propagation

	4. Skywave propagation 5. Line-of-sight propagation **Course Name: Communication Principles** **Course objectives:** Through the study of this course, students can achieve the following objectives: To master the calculation of average self-information, the calculation of symbol rate and information rate and the calculation of error rate; to be able to understand the characteristics and judgment methods of stationary random process; to be able to describe single symbol discrete channel with wo different methods; to be able to calculate the channel capacity of some special channels; to understand the modulation and demodulation process of several amplitude modulation and FM, and to know their characteristics and application situation; to be able to judge whether the system can eliminate the crosstalk between codes based on the transmission function of the system; to understand several common systems without cross-talk and explain the differences between them; to understand the modulation principle and noise resistance of 2ASK, 2FSK, 2PSK and 2DPSK; to understand sampling theorem and code a law 13 polyline for a certain value; to master the principle of several common multiplexing technology and multiple access technology through the comparative explanation, and to understand the frame structure of PCM30/32 system on this basis. **Key knowledge ：** 1. Basic concepts of communication; Definition, system model, information measurement, communication system performance index. The composition of communication system; information and its measurement; the main quality index of communication system. 2. Concept and classification of signal; Statistical characteristics of random variables; stationary random process and Gaussian random process; the mathematical model and capacity of the channel. 3. Amplitude modulation (AM) principle and noise resistance; the principle and anti-noise performance of DSB; the principle and anti-noise performance of SSB; the principle and anti-noise performance of FM system. 4. Digital baseband signal and its spectrum characteristics; the common code type of baseband transmission; the baseband transmission characteristics without inter code crosstalk; the concept of eye map timely domain equilibrium. 5. The principle and performance comparison of binary amplitude shift keying (2ASK), binary shift frequency keying (2FSK), binary phase shift keying (2PSK) and binary differential phase keying (2DPSK); a multi-level digital modulation system. 6. Sampling theorem; the quantification of analog signal; pulse code

	modulation (PCM). Skills: to master sampling and sampling theorem of analog signals and the quantification of sampling signal; A law 13 fold 7. The concepts of frequency division multiplexing and time division multiplexing; the frame structure of pcm30/32 system; the concept of multiple access technology. **Course Name: Basic Experiment of Communication Technology** **Course objectives:** Through the study of this course, students can achieve the following objectives: 1. To master the working principle of LC, crystal oscillator and VCO 2. To master the demodulation method of full carrier amplitude modulation and envelope detection by integrated analog multiplier 3. To master the principle of the frequency modulation circuit of the varactor diode and the working principle of the orthogonal frequency discrimination 4. To master the basic composition and working principle of phase locked loop 5. To understand the working principle of analog multiplication mixer 6. To master the method of generating FSK signal by key control method and the principle of FSK incoherent demodulation 7. To master the concept and working principle of time division multiplexing **Key knowledge ：** **Experiment 1: Use of Experimental Instruments and Boxes** 1. the use method of digital oscilloscope 2. the use method of function signal generator 3. the use method of high frequency and communication principle experimental box **experiment 2: LC, Crystal Oscillator and Voltage Controlled Oscillator** 1. Principle of three point LC sine wave oscillator and crystal oscillator 2. To analyze and compare the frequency stability of LC oscillator and crystal oscillator 3. To change the bias voltage of the varactor to observe the frequency change of the oscillator **Experiment 3: Analog AM and Demodulation** 1. Principle of amplitude modulation (AM) and calculation method of amplitude modulation 2. Principle of diode envelope detection 3. Spectrum analysis of modulation and demodulation **Experiment 4: Analog Frequency Modulation (FM) and Orthogonal Frequency Discrimination** 1. The working principle of frequency modulation of varactor 2. The working principle of orthogonal frequency discriminator **Experiment 5: Analog Phase Locked Loop**

	1. The composition and working principle of phase locked loop 2. The meaning and measurement method of "synchronous belt" and "capture belt" **Experiment 6: Analog Mixing And Signal Spectrum Shift** 1. The frequency conversion process of analog multiplication mixer 2. The relationship between the output intermediate frequency voltage and the local vibration voltage of the analog multiplication mixer 3. The relationship between the output if voltage and the input signal voltage of analog multiplication mixer **Experiment 7: FSK Modulation And Demodulation** 1. The principle of FSK modulation circuit working 2. The principle and method of FSK incoherent demodulation 3. The verification of FSK demodulation process **Experiment 8: Time Division Multiplexing And Demultiplexing** 1.The concept and working principle of time division multiplexing 2. The working principle of time division multiplexing 3. The 256K time division multiplexing and demultiplexing process and signal observation **Course name: Modern Network Technology (Experiment included)** **Course Objectives:** Through the study of this course, students can achieve the following objectives: 1. To master the basic concepts and network structure of the current mainstream network technology; 2. To be familiar with the development process and application prospect of various network technologies; 3.To analyze the basic realization principle and composition structure of various network technologies by means of the basic knowledge of the forerunner course; 4. To be able to understand the main services and implementation process of various networks systematically and in detail; 5. To be able to understand the principle and specific application of key network technologies such as wireless access technology, transmission technology, information processing technology, data exchange technology, OSI reference model, etc. 6. To master the basic configuration, networking and function realization of common network equipment such as switch, router and firewall. 7. To be able to skillfully use simulation platform and network equipment to carry out basic network technology experiments such as network construction, VLAN division, remote management of firewall, etc. 8. To understand the development trend of modern network technology and the current research status of new network technology through the research,

	study and practice of various network technologies, and to lay a good theoretical and practical foundation for the follow-up courses. **Key Knowledge ：** **Theoretical Teaching Contents:** **Chapter 1 The Overview of Communication Network** 1. The composition and classification of communication network; 2. The information processing technology in communication network; 3. The system and topology of communication network; 4. The development trend of communication network; 5. The next generation network based on soft switching. **Chapter 2 Telephone Communication Network** 1. The overview of telephone communication network; 2. The structure of telephone communication network; 3. The signaling system of telephone communication network; 4. The telephone communication network services; **Chapter 3 Digital Mobile Communication Network** 1. The overview of mobile communication; 2. The GSM mobile communication network; 3. The CDMA mobile communication network; 4. The 3G mobile communication system; 5. The research and development of the fourth generation (4G) mobile communication 6. The characteristics and key technologies of the fifth generation (5g) mobile communication. **Chapter 4 Data Communication Network** 1. Data communication network overview; 2. Data exchange technology; 3. Packet switching network X.25; 4. Other data communication networks (ATM, frame relay, N-ISDN, etc.). **Chapter 5 Computer Network And Internet** 1. The computer network overview; 2. The structure and characteristics of computer network; 3. The interconnection of computer network; 4. The development and application of Internet. **Chapter 6 Internet of Things Technology** 1. Basic concepts of Internet of things; 2. The architecture of Internet of things; 3. The RFID technology; 4. The wireless sensor network; 5. The cloud computing technology; 6. The middleware technology and security technology of Internet of things. **Chapter 7 Information Transmission Network** 1. Data transmission medium; 2. The SDH optical network;

	3. The WDM optical network; 4. The digital microwave and satellite communication network; **Chapter 8 User Access Network** 1. The basic concept of access network; 2. The copper wire access network; 3. The optical fiber access network; 4. The wireless access network. **Experimental Teaching Content:** Experiment 1: The Experiment of Twisted Pair Experiment 2: The Basic Experiment of Computer Network Experiment 3: The Basic Configuration of Switch Experiment 4: The Remote Login And Port Aggregation Of Switch Experiment 5: The Switch Division VLAN Configuration Experiment 6: The Realization of Communication Between Vlan with Three Layer Switch Experiment 7: The Configure Firewall Web Management Experiment Experiment 8: The Configure Ethernet Interface Experiment of Firewall **Course Name: Principle and Technology of Mobile Communication** **Course Objectives:** Through the study of this course, students can achieve the following objectives: To master the relevant theoretical knowledge of mobile communication; to master the related technologies, principles and applications involved in mobile communication; to be familiar with the structure, characteristics, business implementation principle and development trend of mobile communication systems. **Key Knowledge ：** 1. The overview of mobile communication; 2. The radio wave propagation and loss model of mobile channel; 3. The coding and modulation technology; 4. The anti-channel fading technology; 5. The networking technology; 6. The 2G mobile communication system; 7. The 3G mobile communication technology; 8. The LTE mobile communication system; 9. The 5G mobile communication prospect
Examination requirements and forms	Electromagnetic Field and Wave: the written test Communication principle: the written test Basic Experiment of Communication Technology: the experimental report Modern Network Technology（Experiment included）: the written test and the experimental report

	Principle and Technology of Mobile Communication: the written test
Teaching aids	Projector/Blackboard/Electronic Document/Display Stand/ppt Courseware/Laboratory
Reading lists	1. SONG Zheng. *Electromagnetic field, microwave technology and antenna* [M]. Xi'an University of Electronic Science and Technology Press, 2017. 2. KE Hengyu. *Fundamentals of electromagnetic field theory* [M]. People's Posts and Telecommunications Press, 2011. 3. XIE Chufang. *Electromagnetic field and electromagnetic wave*, Fourth Edition [M]. Higher education press, 2006. 4. YAO Jun, Mao Xinrong. *Modern information network* [M]. Beijing: People's Posts and Telecommunications Press, December 2016. 5. XIE Xiren. *Computer network* [M]. Beijing: Electronic Industry Press, June 2013. 6. MU Weixin. *Modern communication network* [M]. Beijing: People's Posts and Telecommunications Press, August 2010. 7. ZHANG Zhongquan. *Modern switching technology* [M]. Beijing: People's Posts and Telecommunications Press, March 2009. 8. DING Fei, Zhang Dengyin. *Introduction to the Internet of things* [M]. Beijing: People's Posts and Telecommunications Press, February 2018. 9. LIU Jinhu. *Modern communication network technology* [M]. Beijing: Electronic Industry Press, June 2014. 10. ZHAO Li. *Modern communication network and its key technologies* [M]. Beijing: National Defense Industry Press, June 2011. 11. ZHANG Yunlin. *Signaling system of communication network* [M]. Beijing: Peking University Press, September 2009. 12. XING Yanchen. *Data communication and computer network* [M]. Beijing: People's Posts and Telecommunications Press, September 2011.

Module 7 Advanced Signal Processing Technology

Module name	Advanced Signal Processing Technology
Module number	Module 7
Course name / semester / credit	Speech Signal Processing（Experiment included） / 7/ 2.5 ECTS Digital image processing （Experiment included）/ 7/ 2.5 ECTS
Person responsible for the module (name/professional ranks and titles)	Wang Wei/Associate Professor
Lecturer (name/professional ranks and titles)	Zhang Yuan /Associate Professor，Chen Yun /Lecturer，Fei Li /Lecturer，Yang Huiping /Lecturer， Huang Ying /Lecturer

Teaching language	Chinese
Course attribute	Speech Signal Processing Technology (Experiment included): compulsory Digital Image Processing (Experiment included): compulsory
Teaching methods	Lecture / discussion / practice / autonomous learning / demonstration / experiment
Workload	Speech Signal Processing Technology (Experiment included): 75 hours Digital Image Processing (Experiment included): 75 hours
Credit point	5
Assessment method	Speech Signal Processing (Experiment included): homework, questioning and usual inspection account for 20%, experiment accounts for 20%, and final examination accounts for 60% Digital Image Processing (Experiment included): homework, questions and usual inspection account for 20%, experiment accounts for 20%, and final examination accounts for 60%
Prerequisite courses	Signal and System, Digital Signal Processing
Module course objectives /IntendedLearningOutcomes	● **Module Objectives：** After learning this module, students will master the following main contents: the development process of speech signal processing, speech signal feature analysis, coding, speech recognition technology, etc. Students can also master the common methods of digital image processing, understand the theories of image compression and coding, and have preliminary engineering practice and application innovation capability. ● **Module learning purpose：** Upon successful learning of this module, students should be able to demonstrate the following learning outcomes: 1. Master the acoustic basis of speech signal, feature analysis of speech signal, speech coding, speech recognition and other theories; 2. Master the spatial domain transformation and frequency domain transformation methods of digital image processing, image filtering, enhancement and other theories; 3. Master the theory of image compression and coding.
Course name / course objectives /Key knowledge	**Course Name: Speech Signal Processing (Experiment included)** **Course objectives:** Through the study of this course, students can achieve the following objectives: Understand the development process of speech signal processing, master the acoustic basis and generation model of speech signal, the characteristic analysis of speech signal, the coding and synthesis technology of speech signal, and the speech recognition technology. Students' ability to flexibly use theoretical knowledge to analyze and solve practical problems can be

	cultivated. **Key Knowledge ：** **Theoretical Teaching Content:** **1. Basic Knowledge of Speech Signal Processing;** (1) Basic concepts and parameters of speech (2) Digitization and preprocessing of speech signal **2. Common Algorithms for Speech Signal Processing;** (1) Vector quantization (2) Neural network **3. Speech Signal Analysis;** (1) Speech framing (2) Time domain analysis of speech signal (3) Frequency domain analysis of speech signal **4. Speech Signal Feature Extraction Technology;** (1) Endpoint detection (2) Pitch estimation (3) Formant estimation **5. Speech Enhancement** (1) Speech characteristics, human ear perception characteristics and noise characteristics (2) Filter method **6. Speech Coding** (1) Principle of speech recognition and composition of recognition system (2) Isolated word recognition system (3) Performance evaluation of continuous speech recognition system **7. Speech Recognition** (1) Principle of speech recognition and composition of recognition system (2) Isolated word recognition system (3) Performance evaluation of continuous speech recognition system **Experimental teaching content:** 1. Speech acquisition and reading and writing experiment; 2. Speech signal preprocessing; 3. Voice framing and windowing; 4. Short time domain analysis; 5. Short time frequency domain analysis; 6. Speech endpoint detection experiment; 7. Pitch estimation experiment; 8. Formant estimation experiment; 9. Voice noise reduction; 10. Speech coding;

	11. Speech recognition **Course Name: Digital Image Processing (Experiment included)** **Course Objectives:** Through the study of this course, students can achieve the following objectives: 1. Through the study of this course, students can understand the basic concept of digital image and the principle of digital image formation; 2. Master the theoretical basis and technical methods of digital image processing, with mastering basic theories and implementation methods of digital image enhancement, restoration, compression and segmentation as the focus, and lay a foundation for future work and scientific research in related fields.; 3. Have the ability to initially apply theoretical knowledge to solve general engineering practical problems **Key Knowledge：** **Theoretical Teaching Content:** **Chapter 1 Introduction** 1. Development of digital image technology 2. Image representation, display and storage 3. Relationship between image pixels 4. Image technology and Application **Chapter 2 Fundamentals of Digital Image Processing** 1. Digital image processing system 2. Relationship between image and vision 3. Image digitization process and three color models of image **Chapter 3 Image Transformation** 1. Spatial transformation of image 2. Fourier transform and discrete cosine transform of image 3. Comparison of various transformation methods **Chapter 4 Image Enhancement** 1. Overview of image enhancement technology 2. Time domain image enhancement 3. Frequency domain image enhancement 4. Shannon code, FeNO code and Huffman code **Chapter 5 Image Compression Coding** 1. Basic concepts of data compression 2. Statistical code 3. International standard for digital image compression **Chapter 6 Image Segmentation**

	1. Basic concepts of image segmentation 2. Threshold segmentation 3. Edge detection 4. Hough transform **Chapter 7 Image Description** 1. Basic concepts of morphological description 2. Expansion and corrosion 3. Opening and closing 4. Refinement **Experimental Teaching Content:** 1. Preliminary of MATLAB digital image processing; 2. Algebraic operation of image; 3. Image enhancement - gray scale transformation; 4. Image enhancement and square graph transformation; 5. Image enhancement - spatial filtering; 6. Fourier transform and frequency domain filtering of image; 7. Color image processing; 8. Image segmentation; 9. Morphological operation
Examination requirements and forms	Speech Signal Processing (Experiment included): written test + experimental report Digital Image Processing (Experiment included): written test + experimental report
Teaching aids	Projector / blackboard / electronic document / display stand / ppt/laboratory
Reading list	1. Zhao, L. (2003). *Speech signal processing*. Beijing: Machinery Industry Press. 2. Han, J., Zhang, L., & Zheng, T. (2004). *Speech signal processing*. Beijing: Tsinghua University Press. 3.Ruan, Q. (Ed.). (2007). *Digital image processing*. Beijing: Electronic Industry Press. 4. Wang, R. (2013). *Digital image processing*. Beijing: Tsinghua University Press. 5. Zhao, X. (2015). *MATLAB digital image processing*. Beijing: Beijing University of Aeronautics and Astronautics Press.

Module 8 Fundamentals of Information System Design

Module name	Fundamentals of information system design
Module number	Module 8
Course name / semester /	Principle and application of single chip microcomputer (C language version)

credit	(Experiment included) / 4 / 5.0 ECTS Principle and Application of Single-chip Microcomputer (C Language) (Course Design) / 5 / 1 ECTS Principle and Application of Sensor (Experiment included)/ 5 / 4.5 ECTS Electronic design automation (Experiment included) / 5 / 5.0 ECTS Altium Design design and application (Experiment included) / 6 / 5.5 ECTS Radio Frequency Identification Technology (Experiment included) / 7 / 4ECTS
Person responsible for the module(name/professional ranks and titles)	FENG Wenguo / Senior Engineer
Lecturer(name/professionalranks and titles)	WANG Jun / Senior Engineer, WANG Wei / Associate Professor, HE Chunyan / Associate Professor, DONG Niya / Senior Engineer, DENG Juan / lecturer, LIU Dan / Engineer, ZHANG Hui / lecturer, CHEN Junlin / lecturer, ZHU Yansheng / Assistant, PENG Hong / Assistant, LIAO Guangyan / Assistant
Teaching language	Chinese
Course attribute	Principle and application of single chip microcomputer (C language version) (Experiment included): compulsory Course design of single chip microcomputer principle and application (C language version): compulsory Principle and Application of Sensor (Experiment included): compulsory Electronic design automation (Experiment included): compulsory Altium design design and application (Experiment included): compulsory Radio Frequency Identification Technology (Experiment included): compulsory
Teaching methods	Lecture / discussion / practice / autonomous learning / demonstration / experiment
Workload	Principle and application of single chip microcomputer (C language version) (Experiment included): Teaching: 150 hours Course design of single chip microcomputer principle and application (C language version): Teaching: 30 hours Principle and Application of Sensor (Experiment included): Teaching: 135 hours Electronic design automation (Experiment included): Teaching: 150 hours Altium Design design and application (Experiment included): Teaching: 165 hours Radio Frequency Identification Technology (Experiment included): Teaching: 120 hours
Credit point	25 ECTS
Assessment method	Principle and application of single chip microcomputer (C language version) (Experiment included): homework, questioning and usual inspection account for 20%, experiment accounts for 20%, and final examination accounts for

	60% Course design of single chip microcomputer principle and application (C language version): written test Principle and Application of Sensor (Experiment included): homework, questioning and usual inspection account for 20%, experiment accounts for 20%, and final examination accounts for 60% Electronic design automation (Experiment included): homework, questioning and usual inspection account for 20%, experiment accounts for 20%, and final examination accounts for 60% Altium Design design and application (Experiment included): homework, questioning and usual inspection account for 20%, experiment accounts for 20%, and final examination accounts for 60% Radio Frequency Identification Technology (Experiment included): homework, questioning and usual inspection account for 20%, experiment accounts for 20%, and final examination accounts for 60%
Prerequisite courses	University computer, microcomputer principle, C language programming, digital circuit and logic design
Module course objectives /Intended Learning Outcomes	**Module Objectives:** Through the study of this module, students can master the basic principle of single chip microcomputer and independently develop the software and hardware technology of single chip microcomputer system; master the software related to electronic design automation, and be able to complete circuit schematic drawing, circuit board manufacturing, component welding, electronic system debugging, electronic system fault analysis and troubleshooting; master the basic principle of RFID and be able to design simple RF system. **Module learning purpose:** Upon successful learning of this module, students should be able to demonstrate the following learning outcomes: 1. Master the basic principle of single chip microcomputer and be able to correctly connect the single chip microcomputer with peripheral devices; be able to use Keil software to write C program code and complete the operation of software to hardware; 2. Master hardware description language VHDL, Verilog, etc., be able to use hardware description language for electronic system design, and be able to use Quartus II software for electronic design; 3. Master the use method of Altium design software, and be able to draw schematic diagram, PCB layout, etc. 4. Master the principle of equipment identification.

Course name / course objectives /Key knowledge	**Course Name: Principle and Application of Single-chip Microcomputer（C Language）（Experiment included）** **Course objectives:** Through the study of this course, students can achieve the following objectives: The teaching of this course is aimed at practicality, which increases the proportion of C programming design in teaching content, increases the explanation of practical cases, and explains the theoretical knowledge with classic and practical cases. Compared with the traditional single chip microcomputer teaching, it pays more attention to practical application and practical development, and trains students' practical application ability and innovation ability to achieve the task of improving students' comprehensive quality. 1. Master the basic concept characteristics of computer and single chip microcomputer. 2. It is required to be familiar with the basic structure and working principle of the single chip microcomputer, and master the hardware design and programming method of the SCM system. **Key knowledge:** **Theoretical teaching content:** 1. The basic characteristics and application of single chip microcomputer; 2. Basic structure and pin function of MCS-51 single chip microcomputer; 3. MCS-51 single chip memory storage organization; 4. The minimum system of MCS-51 single chip microcomputer; 5. Command function of MCS-51 single chip microcomputer; 6. C51 program structure, C51 data type, C51 variable and storage type, C51 function; 7. Parallel I/O port of single chip microcomputer, interrupt system of single chip microcomputer, timing / counter of single chip microcomputer, serial port of single chip microcomputer 8. The interface technology between MCU and LED display, and the interface technology between MCU and keyboard; 9. Interface between MCU and DA and AD converter. **Experimental teaching content:** 1. Familiar with keil software platform; 2. IO Experiment 1; 3. IO Experiment 2; 4. Interrupt Experiment 1; 5. Interrupt the extended experiment; 6. Timer test;

	7. LED digital tube experiment **Course Name: Principle and Application of Single-chip Microcomputer（C Language）（Course Design）** **Course objectives:** Through the study of this course, students can achieve the following objectives: 1. Through training the students' ability of working, hands-on, observation, analysis and creation; 2. Cultivate a serious scientific attitude, and combine theory with practice and pragmatic style; 3. Be able to basically have the ability to independently develop software and hardware technology; **Key Knowledge:** 1. Arrangement and explanation of curriculum design topics; 2. Consult relevant data and design the scheme; 3. Design scheme inspection and main program code preparation; 4. Design scheme inspection and main program code preparation; 5. Program compilation and software simulation debugging; 6. Connect the hardware circuit on the experimental box; 7. Download the program and debug to meet the basic functional requirements; 8. Modify the procedure for function improvement and acceptance test. **Course Name: Principle and Application of Sensor (Experiment included)** **Course objectives:** Through the study of this course, students can achieve the following objectives: 1. Master the concept, composition, working principle, application field, measurement circuit and the development trend of sensor technology; 2. Master the working principle and application of resistance strain gauge, inductive type, capacitance type, piezoelectric type, Hall sensor, photoelectric type, ultrasonic sensor and infrared sensor; 3. Have a systematic and correct understanding of sensor measurement methods, and gradually cultivate students' proficiency in sensor application circuit analysis and comprehensive design ability; 4. In the actual project, the corresponding sensor parts will be selected for product design, to improve the understanding and interest in sensors and meet the needs of the society.

	Key Knowledge: **Theoretical part:** **Chapter 1 Introduction** 1. What is sensor 2. Current situation of sensors and development trend at home and abroad 3. Composition principle of detection system 4. Definition, composition and classification method of sensors **Chapter 2 Strain Sensor** 1. Metal strain plate sensor 2. Piezoresistive sensor 3. Application examples **Chapter 3 Inductive Sensors** 1. Self sensing sensor 2. Differential transformer 3. Eddy current sensor **Chapter 4 Capacitance Sensor** 1. Working principle of capacitance sensor 2. Measuring circuit of capacitance sensor 3. Application example of capacitance sensor **Chapter 5 Piezoelectric Sensors** 1. Piezoelectric effect 2. Piezoelectric materials 3. Measuring circuit 4. Application **Chapter 6 Hall Sensor** 1. Hall effect 2. Hall element 3. Integrated Hall sensor 4. Application of Hall sensor **Chapter 7 Photoelectric Sensors** 1. Photoelectric effect 2. Photosensitive resistance 3. Photocell 4. Photodiodes and phototriodes 5. Charge coupled device **Experiment part:** 1. Close Hall sensor experiment 2. Speed measurement experiment of photoelectric sensor 3. Eddy current sensor experiment 4. Bridge performance test of resistance sensor

	5. Sound control prosody lamp experiment 6. Experiment on the characteristics of photosensitive resistance 7. Photoelectric tube to tube experiment 8. Ultrasonic ranging experiment **Course Name: Electronic Design Automation (Experiment included)** **Course objectives:** Through the study of this course, students can achieve the following objectives: 1. Through the study of this course, students can grasp the design of various circuit systems by using hardware description language; 2. Improve the ability of analyzing and solving problems and improve the practical ability; 3. From the teaching method, the basic concept, basic theory and basic design method of EDA technology are emphasized, and the combination of theory and practical problems is emphasized; 4. Through a large number of specific digital circuit design analysis and practice, students can deepen their understanding of circuit design, and have the ability to apply theoretical knowledge to solve practical problems in general engineering. **Key knowledge:** **Part 1 Theoretical knowledge:** **Chapter 1: EDA Technology Overview and Programmable Logic Devices** 1. Introduction of EDA technology and platform 2. Introduction to HDL language and software 3. Development, classification, characteristics and application of programmable logic devices **Chapter 2 Maxlusii Software** 1. Use of maxlusii 2. Graphic design 3. Compile, simulate, pin lock **Chapter 3 VHDL Hardware Description Language** 1. VHDL program structure 2. VHDL language elements 3. VHDL statement: sequential statement and parallel statement **Chapter 4 Common Design of Combinatorial Logic** 1. Design of adder 2. Design of data selector 3. Design of decoder 4. Encoder design

	Chapter 5 Design of Common Sequential Logic 1. Design of counter 2. Design of JK Trigger **Chapter 6 Design of Electronic System Based on FPGA** 1. Introduction to the laboratory 2. Use of the laboratory 3. Design of seven person voting device based on FPGA **Part 2 Course Experiment** 1. Familiar with the design process of maxplusII development tool 2. Graphic design of maxplusII 3. Graphic design of medium scale integrated devices 4. VHDL description of basic door circuit 5. VHDL description of combined logic circuit 6. VHDL description of sequential logic circuit 7. Design of electronic system based on FPGA **Course Name: Altium Design and Application (Experiment included)** **Course objectives:** Through the study of this course, students can achieve the following objectives: 1. Through the study of this course, students can grasp the basic steps of PCB design firmly from the content; 2. From the aspect of ability, students should have certain practical ability and have the ability to complete PCB circuit design; 3. From the teaching method, the PCB design foundation and the PCB design of the circuit are introduced comprehensively and systematically by using Altium design software; 4. Through the study of this course, students can master the drawing of component library, the drawing of PCB library, and the drawing of schematic diagram. At the same time, students can learn the PCB drawing. **Key Knowledge:** **Part 1 Theoretical Knowledge:** **Chapter 1 PCB Overview** 1. PCB development process 2. Altium designer interface 3. Brief introduction of basic knowledge of electronic design **Part 2 Course Experiment** 1. AD10 software installation 2. Component library drawing of AD10 software

	3. PCB component library drawing 4. Schematic drawing 5. PCB drawing **Course Name: Radio Frequency Identification Technology (Experiment included)** **Course objectives:** Through the study of this course, students can achieve the following objectives: 1. The course focuses on mastering RFID digital communication technology, antenna technology and middleware technology; 2. Students are required to master the general design and development methods of RFID system through the above-mentioned content study; 3. Finish each extra-curricular homework independently, especially the design homework; 4. Familiar with RFID standards and standards system; 5. Master RFID application technology; Through the study of this experimental course, students can achieve the following objectives: 1. Master the design scheme and middleware design of low frequency ISO/IEC14223 electronic label reading and writing system. 2. Master the design scheme and middleware design of reading and writing system under high frequency ISO/IEC14443 standard. 3. Master the design scheme and middleware design of reading and writing system under high frequency ISO/IEC15693 standard. 4. Master certain hardware design, debugging scheme and means, be familiar with engineering design process and code writing process, and prepare for relevant projects in the future. **Key knowledge:** **Theoretical part:** **Chapter 1 Overview of RFID Technology and System** 1. Understand the composition of RFID system; 2. Preliminary understanding of RFID technology and system architecture. 3. Master the basic physics principle in RFID technology. 4. Master the system characteristics of RFID technology. **Chapter 2 RFID Design Technology Foundation** 1. Master signal coding and modulation; 2. Master the RFID data transmission principle and integrity verification; 3. Understand the security of RFID data transmission. **Chapter 3 RFID Antenna Technology**

	1. Master RFID RF physical layer design; 2. Understand the antenna circuit of reader; 3. Master the inductively coupled analysis of reader and transponder (electronic label). **Chapter 5 RFID Electronic Label Technology** 1. Master the actual design and difference of electronic labels in different frequency bands; 2. Master the general selection specification of electronic labels. **Chapter 7 RFID Standard System** 1. Understand EPCglobal; 2. Understand ISO/IEC (15693); 3. Understand ISO/IEC (14443, 18000-6). **Chapter 8 Middleware and Application Design** 1. Master the sensor application in RFID technology. 2. Master various middleware technologies in RFID technology. 3. Master the design method of general RFID system. **Experimental Part** **Experiment 1 ISO/IEC14223 Card Reading Experiment** 1. Master the working principle of ISO/IEC14223 card reader. 2. Master the software principle and working flow of ISO/IEC14223 system. **Experiment 2 ISO/IEC14443 Reading and Writing Card Experiment** 1. Master the internal structure and storage principle of M1 card. 2. Master the working principle of RC522 card reader. 3. Master the software design principle and workflow of ISO/IEC14223 reading and writing card equipment. **Experiment 3 ISO/IEC15693 Automatic Acquisition of UID Experiment** 1. Master the storage structure and principle of ICODE card. 2. Master the working principle of THM3070 card reader. 3. Master the working flow of how to automatically acquire the UID of electronic labels in antenna field through the program. **Experiment 4 ISO/IEC15693 Manual Acquisition of UID Experiment** 1. Master the software flow of THM3070 reset antenna field. 2. Master the difference between automatic acquisition UID and manual acquisition. **Experiment 5 ISO/IEC15693 Reading and Writing Card Experiment** 1. Familiar with the reading and writing process and precautions of ICODE card. 2. Master the software design principle and workflow during ICODE reading and writing. **Experiment 6 ISO/IEC15693 Multi Card Identification Experiment**

	1. Master the problems caused by data collision and collision. 2. Master the problems that need to be solved in the design of multi card identification. 3. Master the software design process and workflow of multi card identification middleware. **Experiment 7 ISO/IEC14223 Comprehensive Design Experiment 1** 1. Master the process of reading label number of ISO/IEC14223 card and write the modification procedure. 2. Master middleware programming to realize communication between web and lower computer. **Experiment 8 ISO/IEC14223 Comprehensive Design Experiment 2** 1. Master the middleware programming method and realize the process of establishing card number list. 2. Master the control logic design process of the middleware to the reader. 3. Master the programming method of adding and deleting the list.
Examination requirements and forms	Principle and Application of Single-chip Microcomputer (C Language) (Experiment included): written test + experimental report Principle and Application of Single-chip Microcomputer (C Language) (Course Design): course report Principle and Application of Sensor (Experiment included): written test + experimental report Electronic Design Automation (Experiment included): written test + experimental report Altium Design Design and Application (Experiment included): written test + experimental report Radio Frequency Identification Technology (Experiment included) (Experiment included): written test + experimental report
Teaching aids	Projector / blackboard / electronic document / display stand / ppt courseware/laboratory
Reading list	1. Edited by XIE Weicheng, *Single chip microcomputer and embedded control technology and C51 program design* [M]. Beijing: Tsinghua University Press, 2019. 2. QIU Chunling, *Fundamentals of single chip microcomputer and embedded system* [M]. Beijing: Machinery Industry Press, 2016. 3. HU Xiangdong. *Sensor and detection technology* (3rd Edition) [M]. Beijing: Machinery Industry Press, May 2018. 4. WANG Huaxiang. *Sensor principle and application* [M]. Tianjin: Tianjin University Press, February 2007. 5. YE Xiangbin. *Sensor and test technology* [M]. Beijing: National Defense

	Industry Press, February 2000. 6. LIU Hongli. *Sensing and detection technology* [M]. Beijing: National Defense Industry Press, May 2007. 7. ZENG Guangyu. *Fundamentals of modern sensor technology and application* [M]. Beijing: Beijing University of Technology Press, 2006. 8. YU Youwen. *Sensor principle and engineering application* (Fourth Edition) Xi'an: Xi'an University of Electronic Science and Technology Press, May 2014. 9. TAN Huisheng. *EDA technology and application* [M]. Xi'an: Xi'an University of Electronic Science and Technology Press, 2018. 10. HE Chunyan. *EDA technology and application* [M]. Xi'an: Xi'an University of Electronic Science and Technology Press, 2017. 11. PAN yongxiong. *Practical course of electronic circuit CAD -- Based on Altium designer platform* [M]. Xi'an: Xi'an University of Electronic Science and Technology Press, 2016. 12. XU Yi. *RFID principle and application* (2nd Edition) [M]. Beijing: Tsinghua University Press, August 2020. 13. XU Yi. *RFID principle and application* (1st Edition) [M]. Beijing: Tsinghua University Press, January 2013. 14. ZHENG Zhenyu. *Altium designer PCB drawing board express* [M]. Beijing: China Machine Press, 2016.

Module 9 Design of Comprehensive Information System

Module Name	Design of Comprehensive Information System
Module Number	Module 9
Course Name / Semester / Cedit	Embedded System Design（Experiment included） / 6 / 4.5 ECTS Application of DSP Chip (Experiment included) / 6 / 4.5 ECTS Design and Innovation of Electronic System (Experiment)/ 7/ 4.5ECTS
Person Responsible for the Module (name/job title)	Feng Wenguo / Senior Engineer
Lecturer(name/ /job title)	Wang Wei / Associate Professor, Wang Jun / Senior Engineer, Fei Li / lecturer, Liu Dan / Engineer, Zhang Hui / lecturer, Peng Hong / Assistant
Teaching Language	Chinese
Course Attribute	Embedded System Design（Experiment included）: compulsory Application of DSP Chip（Experiment included）: compulsory

	Design and Innovation of Electronic System（Experiment）: compulsory
Teaching Methods	Lecture / discussion / practice / autonomous learning / demonstration / experiment
Workload	Embedded System Design（Experiment included）: Teaching: 135 hours Application of DSP Chip（Experiment included）: Teaching: 135 hours Design and Innovation of Electronic System（Experiment）: Teaching: 165 hours
Credit Point	14.5 ECTS
Assessment Method	Embedded System Design（Experiment included）: homework, questioning and usual inspection account for 30%, experiment accounts for 20% and final examination accounts for 50% Application of DSP Chip（Experiment included）: homework, questions and usual inspection account for 20%, experiment accounts for 20%, and final examination accounts for 60% Design and Innovation of Electronic System（Experiment）: Design Report
Prerequisite Courses	University Computer, C Language Programming, Principle and Application of Single Chip Microcomputer, Electronic Design Automation
Module course objectives / Intended Learning Outcomes	**Module Objectives：** Through the study of this module, students' cooperative working ability, practical ability, observation ability, analysis ability and creativity are cultivated; Cultivate students' ability to independently develop software and hardware technology; Cultivate students' comprehensive electronic system design ability. **Intended Learning Outcomes:** Upon successful learning of this module, students should be able to demonstrate the following learning outcomes: 1. Master the design method of embedded system based on ARM11, and be able to design simple embedded system; 2. Master the working principle of DSP chip and be able to write programs with the help of integrated development environment to complete digital signal processing; 3. Be able to design a complete and comprehensive electronic system.

Course Name / Course Objectives /Key Knowledge Points	**Course Name: Embedded System Design**（Experiment included） **Course objectives:** Through the study of this course, students will achieve the following objectives: 1. Master the basic principle, concept, system structure and functions of embedded system technology. 2. Understand and master ARM system structure, instruction system, addressing modes, programming methods and embedded system development process. 3. Familiar with the on-chip resources of STM32F103xx series chip; understand the structure of stm32f103xx series chip; master the system control module and interrupt system of STM32F103xx series chip. 4. Master each function module, C language programming and system development process in STM32F103xx. **Key Knowledge Points:** **Theory Teaching:** **Chapter 1 Initial Knowledge of ARM Embedded System** 1. Introduction to ARM embedded system 2. Development environment of ARM embedded system 3. Hardware structure of ARM embedded system 4. ARM embedded system development example: vehicle embedded chip stm32f103xx **Chapter 2 ARM Instruction System** 1. Introduction to arm instruction system 2. Basic concept of arm instruction set 3. Type of arm instruction set 4. Thumb instruction set **Chapter 3 Technical Basis of STM32** 1. Introduction to STM32F103XX system 2. Pin information of STM32F103XX 3. Internal structure of STM32F103XX 4. Memory mapping of Stm32f103xx 5. System control module of STM32F103XX 6. STM32F103XX vector interrupt controller **Chapter 4 STM32f103xx Programming**

	1. Assembly language programming 2. Programming in C language 3. Mixed programming of assembly language and C language **Chapter 5 STM 32f103xx Function Module** 1. Functional modules in STM32F103xx 2. Control registers of STM32F103xx function module 3. Use of STM32F103xx function modules **Practical Teaching:** 1. The ARM development environment experiment 2. I/O mouth experiment 3. Digital tube display experiment 4. Interrupt experiment 5. The ARM serial communication experiment 6. Real time clock experiment 7. The watchdog experiment 8. PWM experiment **Course Name: Application of DSP Chip（Experiment included）** **Course Objectives:** Through the study of this course, students can achieve the following objectives: 1.Understand and master the hardware structure, working principle, data addressing mode and instruction system of TMS320C54 series DSP chip 2. Understand the development and application of the new generation DSP chip. 3. Master TMS320C54 series DSP chip peripherals and their applications. 4. Be able to use assembly language for software assembly, linking and debugging. **Key Knowledge Points:** **Theoretical Teaching:** **Chapter 1 Introduction** 1.1 Calculation basis **Chapter 2 CPU Structure and Memory Configuration of TMS320C54x** 2.1 Structure of TMS320C54x DSP 2.2 Bus structure of TMS320C54x 2.3 CPU structure of TMS320C54x 2.4 TMS320C54x memory and I / O space

	Chapter 3 Instruction System 3.1 Data addressing mode 3.2 Instruction system of TMS320C54x **Chapter 4 TMS320C54x Assembly Language Programming** 4.1 Basic concepts of TMS320C54x assembly language 4.2 Basic method of TMS320C54x assembly language programming 4.3 Editing, assembly and linking process of TMS320C54x assembly language programming 4.4 Assembler 4.5 Linker 4.6 Usage of simulator **Chapter 5 Pin function, Pipeline Structure and External Bus Structure of TMS320C54x** 5.1 Pin and signal description of TMS320C54x 5.2 Pipeline structure 5.3 External bus structure **Chapter 6 TMS320C54x Chip Internal and External Equipment** 6.1Clock generator 6.2 Interrupt system 6.3 Timer 6.4 Host interface 6.5 Serial port **Chapter 7 CCS Development Tools and Applications** **Experimental Teaching:** 1. Cyclic operation; 2. Floating point operation; 3. FFT experiment; 4. FIR test; 5. Nixie tube control experiment; 6. LCD experiment; 7. Speech A / D, D / a conversion experiment; 8. FFT of signal generator module. **Course Name: Design and Innovation of Electronic System（Experiment）** **Course objectives:** Through the study of this course, students can achieve the following objectives: 1. Master the design steps and common design software of electronic system design; 2. Have skilled and accurate electronic system design ability, abstract thinking

	ability and logical reasoning ability; 3. Have a certain system design idea, and be able to apply this idea to the whole process of raising, analyzing and solving problems 4. Understand the relationship between theoretical knowledge and practical operation skills of electronic system specialty; 5. Be able to apply electronic system design in life and work to meet the needs of social and economic development. **Key Knowledge Points:** **Chapter 1 Overview** 1. Design steps of electronic system 2. Design methods of electronic system 3. Specific development process of electronic system 4. Electronic system planning cases **Chapter 2 Development Tools** 1. Circuit board design software 2. Programming software 3. Analog circuit design software 4. Common software of FPGA and CPLD **Chapter 3 Human machine Interface** 1. Keyboard 2. Touch screen 3. LED display 4. Character LCD **Chapter 4 Signal Acquisition** 1. Temperature measurement 2. Pressure measurement 3. Voltage detection 4. Current detection 5. Speed detection **Chapter 5 Signal Processing** 1. Operational amplifier 2. Passive filter 3. Active power filter 4.ADC 5.PID 6.FIR **Chapter 6 Data Communication** 1. RS-232 communication 2. RS-485 communication 3. Infrared communication

	4. Wireless communication **Chapter 7 Control Output** 1. DAC 2. Micro printer 3. DC motor 4. Stepping motor 5. Real time clock 6. EEPROM **Chapter 8 System Power Supply** 1. Voltage regulator 2. Lithium battery charging management 3. Power monitoring 4. Switching power supply
Examination Requirements and Forms	Embedded System Design （ Experiment included ） : written test 60%; experiment 40% Application of DSP Chip（Experiment included）: written test 50%; experiment 50%. Design and Innovation of Electronic System（Experiment）: usual inspection 60%, design report 40%
Teaching Aids	Projector / blackboard / electronic document / display stand / ppt courseware/laboratory
Reading List	1. MA Honglian, Ding Nan. Embedded System Design Tutorial, 3rd Edition [M]. Beijing: Electronic Industry Press [M], 2016,09. 2. Xiao Guangbing, ARM Embedded Development Example - System Design Based on STM32 [M]. Beijing: Electronic Industry Press, 2013. 3. LI Li. DSP Principle and Application [M]. Beijing: China Water Resources and Hydropower Press [M], 2014. 4. Qiao Ruiping, Cui Tao, Hu Yuping. Principle and Application of TMS320C54x DSP (2nd Edition) [M]. Xi'an: Xi'an University of Electronic Science and Technology Press, 2012. 5. Chen Xiaoqiao. Integrated Design ofElectronic System [M]. Beijing: Tsinghua University Press, may 2019. 6. Wang Jiaxiang. Electronic System Design [M]. Xi'an: Xi'an University of Electronic Science and Technology Press, 2016.

Module 10 Graduation Project

Module Name	Graduation Project
Module Number	Module 10
Course Name / Semester / Credit	Corporate /On-campus Internship / 7 / 9 ECTS Graduation Project（Thesis）/ 8/ 27ECTS
Person Responsible for the Module(name/ job titles)	Wang Wei/Associate Professor
Lecturer (name/job titles)	Professional course teachers of the whole college
Teaching Language	Chinese
Course Attribute	Corporate / On-campus Internship: compulsory Graduation Project（Thesis）: compulsory
Teaching Methods	Lecture / discussion / practice / autonomous learning / presentation
Workload	Corporate /On-campus Internship: Teaching: 270 hours Graduation Project（Thesis）: Teaching: 16 weeks
Credit Point	36
Assessment Method	Corporate /On-campus Internship: submit internship report, internship performance and practice reply acceptance account for 30%, internship report accounts for 70%. Graduation Project （Thesis）: mentor's scores 30%, scores of the review teachers 30% and the respondents' scores 40%
Prerequisite Courses	Complete all theoretical courses
Module Course objectives / Intended Learning Outcomes	● **Module Objectives：** Graduation practice is a practical teaching link that transforms professional knowledge into comprehensive application ability to adapt to future work. Through the study of this module course, students can obtain professional knowledge in information acquisition, information transmission, signal processing and so on. Students should be able to design the electronic system with the help of professional software, and use professional instruments to test the electronic system. Through the learning and training of this module, students will have the ability to comprehensively apply the learned knowledge in solving practical problems of engineering projects, innovative thinking ability and teamwork ability. Graduation thesis is the cultivation of a comprehensive application ability of professional knowledge after finishing the whole courses for students majoring in electronic engineering and information technology. The graduation thesis instructor gives a topic or project of electronic information engineering. The students analyze and study the existing problems by finding the reference materials related to the subject or project within the specified time, and then solve the problems. Finally, students will write the graduation thesis report and complete the defense within the specified time. The whole design can comprehensively cultivate students' knowledge, depth of

	knowledge, ability to deal with problems by combining theory with practice, experimental ability, foreign language level, computer application level, written and oral expression ability。 ● **Module Intended Learning Outcomes：** 1. Be familiar with the work content, environment and operation requirements of signal processor, electronic system hardware engineer and electronic system software engineer. 2. Master the learned theoretical knowledge and improve the comprehensive application ability. 3. Acquire the ability to analyze and solve problems. 4. Know the writing methods for obtaining scientific and technological papers. 5. Through the implementation of graduation practice module, strengthen the application of students' professional skills and improve students' engineering practice ability and engineering literacy. 6. Collect documents, sort out materials and submit a qualified internship report; 7. Improve students' engineering practice ability, engineering project planning, design and management ability, team cooperation and service support ability.
Course Name / Course Objectives /Key Knowledge Points	**Course Name: Corporate /On-campus Internship** **Course Objectives:** Through the study of this course, students can achieve the following objectives: Through effective learning in this course, students will be proficient in professional skills, have the ability to undertake the design and implementation of electronic information engineering projects, complete graduation design related work, and improve individual project planning and engineering design capabilities. **Key Knowledge Points：** 1. The purpose and significance of graduation internship; 2. The purpose of graduation internship and the significance of graduation internship; 3. Business knowledge of internship unit; 4. Hardware design of electronic system; 5. Software design of electronic system; 6. Test of electronic system; 7. Feedback and summary of graduation internship results: graduation internship achievement display, requirements for writing internship materials, evaluation system of internship effect, summary and reflection of graduation

	internship **Course Name: Graduation Project（Thesis）** **Course Objectives:** Through the study of this course, students can achieve the following objectives: 1. Understand new technology, new products and application prospects in the field of electronic information engineering, consolidate the theoretical knowledge, expand the knowledge, and improve the ability to comprehensively apply the knowledge and skills learned; 2. Master the correct thinking methods and basic skills; 3. Master the technology of application development; 4. Master the general procedures and methods for writing scientific and technological papers, improve the ability of students to think independently and unite and cooperate, and promote the students to establish rigorous scientific attitude and work style. **Key Knowledge Points：** 1. Give a subject or project by the instructor 2. Students can find relevant technical data by selecting the subject or project, and analyze and research them, and make achievements. 3. Students write graduation design papers. 4. Complete the graduation defense within the specified time.
Examination Requirements and Forms	Corporate/On-campus Internship Assessment Graduation Project（Thesis）Assessment
Teaching Aids	Projector / blackboard / electronic document / display stand / ppt courseware
Reading List	The instructor will give the corresponding reading list according to the specific graduation project

Module 11 English

Module Name	English
Module number	Module 11
Course name / semester / credit	College English（1）/ 1 / 6ECTS College English（2）/ 2 / 4ECTS College English（3）/ 3 / 4ECTS College English（4）/ 4 / 6ECTS English for IT Professionals / 6 / 4ECTS
Person responsible for the module(name/professional ranks and titles)	CHEN Youmei/Lecturer
Lecturer(name/professional ranks and titles)	CHEN Youmei/Lecturer, YANG Chengxia/Lecturer, LI Leyan/Lecturer, QU Meiyu/Lecturer, WAN Jiang/Lecturer, YUAN Yangchun/Lecturer, ZOU Jia/Teaching Assistant
Teaching language	English-Chinese bilingual
Course attribute	College English (1): compulsory College English (2): compulsory College English (3): compulsory College English (4): compulsory English for IT Professionals: compulsory
Teaching methods	Lecture/discussion/practice/self-learning/demonstration/experiment
Workload	College English(1):Teaching:180hours College English(2):Teaching:120hours College English(3):Teaching:120hours College English(4):Teaching:180hours English for IT Professionals:Teaching:120hours
Credit point	24ECTS
Assessment	College English(1)(2)(3)(4): Homework,questioning30%, half term test10%, oral test10%, final exam50% English for IT Professionals: Homework,questioning and examination:40%,final exam:60%
Prerequisite courses	None
Module objectives/Intended learning outcomes	● **Module Objectives：** Through the study of each course of the English module, students can master English language knowledge, improve language application skills, be familiar with English learning strategies and understand cross-cultural communication. The teaching content integrates the five skills of listening, speaking, reading, writing and translation. Through the input of word formation, reading and grammar, students can master the basic knowledge

	of English; Through the output training of oral English, writing and translation, cultivate students' ability to use English to solve practical problems. Through the study of workplace English in the IT industry, students can memorize and correctly understand the professional vocabulary and terms commonly used in the professional field of electronic information engineering in the English context, and finally have the ability to read, communicate and write technical reports related to electronic information engineering, so as to meet the needs of practical work in the future. ● **Intended Learning Outcomes:** Upon successful learning of this module, students should be able to demonstrate the following learning outcomes: 1. Improve the four basic skills of English: listening, speaking, reading and writing, improve language and cultural literacy, and acquire cross-cultural communication skills. 2. Master basic English language knowledge and skills, be familiar with a certain amount of professional vocabulary, and be able to skillfully read and translate relevant professional literature. 3. Cultivate professional English reading ability, understand the characteristics of English for science and technology, understand the vocabulary classification and composition methods in professional English, and improve the reading quality and speed of professional English.
Course name / Course objectives /Key knowledge	**Course Name: College English (1)** **Course objectives:** Through the study of this course, students can achieve the following objectives: 1. Listening comprehension ability: can understand simple English conversations on everyday topics; can understand English courses of the corresponding level taught in English; can use limited listening skills. 2. Oral expression ability: be able to have a short conversation on daily topics in English; be able to make a brief speech on familiar topics after preparation. The structure of language expression is clear. Ability to use limited conversational skills. 3. Reading comprehension ability: can basically read English newspaper articles and other English materials with familiar themes and simple language difficulty; can read English textbooks with the help of dictionaries, grasp the main idea, understand the main facts and relevant details. can use limited reading skills. 4. Written expression ability: can describe personal experience, perception, emotion and events in simple English. Ability to use limited writing skills. 5. Translation ability: be able to translate English and Chinese texts with the help of dictionary, which are familiar with the subject matter, clear structure

	and simple language. The translation is basically accurate without major understanding and language expression errors. Can use translation skills in a limited way. **Key knowledge：** **Unit 1：Writing for Myself** 1. Key language points and sentence patterns; 2. Understand the cultural background of Italian noodles and the American educational system; 3. Master the general idea and time sequence structure and narrative skills of the article; **Unit 2：All the Cabbie Had Was a Letter** 1. Key language points and sentence patterns; 2.Cultural background of Halloween and proverbs of friends and friendship idioms; 3. The article's general idea and the skill of narration around a center; 4. The characteristics of informal English style; **Unit 3：Public Attitudes Toward Science** 1. Key language points and sentence patterns; 2. The cultural background of Einstein, Hawking and Frankenstein; 3. Writing skills of the article's general meaning and "theme + supporting details + conclusion"; 4. Appreciate the characteristics of narrative description and descriptive description; **Unit 4：Tony Trivisonno's American Dream** 1. Master key language points and sentence patterns; 2. Type a personality and the cultural background of workaholic; 3.The writing skills of the general meaning and narration + argumentation; 4. Supporting details describe the character characteristics; **Unit 5：The Company Man** 1. Key language points and sentence patterns; 2. The American dream and the cultural background of the Great Depression; 3. The general meaning and structure of the text; 4. Writing characteristics of satirical rhetoric; **Unit 6：A Valentine Story** 1. Key language points and sentence patterns; 2. Cultural background of Valentine's day; 3. The general meaning and structure of the text; 4. The writing characteristics of metaphorical rhetoric and temporal switching; **Course Name: College English (2)** **Course objectives:** Through the study of this course, students can achieve the following

	objectives: 1. Listening comprehension ability: can understand English teaching, understand daily English conversation and general lecture, and basically understand English national special English program, with a language speed of about 130 words per minute, master its central meaning and grasp key points. Can use basic listening skills to help understanding. 2. Oral expression ability: can communicate in English during learning and discuss a topic. Be able to talk to people from English speaking countries on daily topics. Be able to make a brief speech on familiar topics after preparation, and express clearly, and the pronunciation and intonation are basically correct. Ability to use basic conversation strategies in conversation. 3. Reading comprehension ability: can basically read English articles with general themes, and the reading speed reaches 70 words per minute. When reading materials with long length and slightly lower difficulty, the reading speed reaches 100 words per minute, can basically read domestic English newspapers and magazines, master the central thinking, understand the main facts and relevant details. Can read the materials of the common application style in work and life. Can use effective reading methods in reading. 4. Written expression ability: can complete general writing tasks with common applied styles, describe personal experience, events, feelings, feelings, etc., and write 120 short articles in half an hour on general topics or outlines, with basic complete content, proper use of words and coherent discourse. Ability to use appropriate writing skills in general or applied writing. 5. Translation ability: be able to translate articles familiar with the subject matter with the help of dictionary. The translation speed of English-Chinese is 300 English words per hour, and the translation speed of Chinese and English is 250 Chinese characters per hour. It can use appropriate translation skills in translation. **Key Knowledge ：** **Unit 1：Learning, Chinese-Style** 1. Key language points and sentence patterns; 2. Cultural background of Western Education; 3. The article structure of the article meaning and theme + comparison + conclusion; 4. Different contrast methods and writing traits; **Unit 2：A Life Full of Riches** 1. Key language points and sentence patterns; 2. Cultural background of happiness, marriage and morality; 3. The meaning of the article and the structure of the text; 4. The features of "riches" in the title of the article; **Unit 4：A Virtual Life**

	1. Key language points and sentence patterns; 2. Cultural background of online learning and virtual social network; 3. The comparative structure between the meaning of the article and the virtual life and the real life; 4. Some computer and Internet related vocabulary; **Unit 5：True Height** 1. Key language points and sentence patterns; 2. Soul chicken soup and cultural background of the Olympic Games; 3. The general meaning of the article and the structure of flashback; 4. The skills of text description; **Unit 6：A Woman Can Learn Anything a Man Can** 1. Key language points and sentence patterns; 2.Feminist and women's liberation, international women's day and the cultural background of Barbie dolls; 3. The meaning of the article and the structure of the text; 4. The characteristics of different forms of concession clauses; **Unit 7：The Glorious Messiness of English** 1. Key language points and sentence patterns; 2. English language history and Shakespeare's cultural background; 3. The meaning of the article and the structure of the text; 4. The characteristics of daily idioms in the article; **Course Name: College English (3)** **Course objectives:** Through the study of this course, students can achieve the following objectives: 1. Listening comprehension ability: can basically understand the conversation and lectures from people from English speaking countries, and can understand domestic English broadcasting or TV programs with familiar subjects and medium length, with a language speed of about 140 words per minute. Can master the central idea and grasp the key points. 2. Oral expression ability: be able to have a relatively fluent conversation with people from English speaking countries, master conversation strategies, basically express personal opinions, emotional views, etc., and basically state facts, events, reasons, etc., express clear ideas, and basically correct voice and intonation. 3. Reading comprehension ability: can read articles on general subjects of national newspapers and magazines in English language, with reading speed of 70 words per minute. When reading materials with long length quickly, the reading speed reaches 110 words per minute, and can skim or search for reading materials. Be able to understand the central idea correctly, grasp the main facts and relevant details. 4. Written expression ability: can write daily application articles, write reports and papers related to the profession, have clear structure and rich

	contents with reference materials, describe various charts, write 140 words short articles on certain topics within half an hour, with complete content, clear structure and smooth writing. 5. Translation ability: can translate articles familiar with the common English and American newspapers and magazines with the help of dictionaries, and can extract and translate English popular science articles of the major. The English-Chinese translation speed is 330 English words per hour, and the Chinese English translation speed is 280 Chinese characters. The translation is basically smooth and meaningful, and there is no major language error. **Key knowledge ：** **Unit 1：Mr. Doherty Builds His Dream Life** 1. Master key language points and sentence patterns; 2. To understand the cultural background of the rural areas in China and Western countries; 3. Master the general idea of the article; To appreciate the writing skills and characteristics of transitional paragraphs in the article; **Unit 2：The Freedom Givers** 1. Master key language points and sentence patterns; 2. To understand the cultural background of civil rights movement and "underground" in the United States; 3. Master the general idea of the article; Try to use library and other resources to find information related to this unit; **Unit 3：The Land of The Lock** 1. Master key language points and sentence patterns; 2. To understand the cultural background of airport security inspection and crime prevention; 3. Master the meaning of the article and the structure of the text "opening + subject + conclusion"; Learn to use facts to support core ideas; **Unit 4：Was Einstein A Space Alien?** 1. Master key language points and sentence patterns; 2. Understand the cultural background of famous physicists in Silicon Valley and the world in the United States; 3. Master the general idea of the article; The article analyzes the characteristics of the title, sub title and quotation; **Unit 5：Writing Three Thank-You Letters** 1. Master key language points and sentence patterns; 2. Understand the cultural background of Indians, Thanksgiving and Mayflower; 3. Master the general idea of the article; Learn to memorize words by association; **Unit 6：The Last Leaf** 1. Master key language points and sentence patterns;

	2. To understand the cultural background of O. Henry and the world philanthropic pioneer; 3. Master the general idea of the article; To appreciate the writing characteristics of a narrative by repeated clues; **Course Name: College English (4)** **Course objectives:** Through the study of this course, students can achieve the following objectives: 1. Listening comprehension ability: can basically understand the conversation and lectures of people from English speaking countries, and domestic English broadcasting or television programs with familiar subject matter and long length. The language speed is about 150 words per minute, and can master the central meaning, grasp the key points and relevant details. 2. Oral expression ability: be able to have a more fluent and accurate dialogue or discussion on general or professional topics, summarize the text or speech with long content and slightly difficult language in concise language, and participate in the discussion of general topics in English. 3. Reading comprehension ability: can basically read English articles with general themes, reading speed reaches 90 words per minute, and the correct rate of solving problems reaches 70%. When reading materials with long length and slightly lower difficulty, the speed of reading reaches 120 words per minute. Can basically read and understand domestic English newspapers and magazines, master the central meaning, understand the main facts and relevant details. Can read the materials of the common application style in work and life. Can use effective reading methods in reading. 4. Written expression ability: can complete general writing tasks, describe personal experience, perception, emotion and events, etc., write common application articles, write short articles with more than 150 words in half an hour on general topics or outline, with basic complete content, proper use of words and coherent meaning. Ability to master basic writing skills. 5. Translation ability: be able to translate articles familiar with the subject matter with the help of dictionary. The translation speed is 350 English words per hour and Chinese English translation speed is 300 Chinese characters per hour. The translation is fluent and can use appropriate translation skills in translation. **Key knowledge ：** **Unit 1：Fighting with the Forces of Nature）** 1. Master key language points and sentence patterns; 2. Understand Napoleon, Hitler; 3. The cultural background of the Second World War;

	4. Master the general idea of the article; It can compare and compare Napoleon and Hitler's invasion of Russia; **Unit 2：Smart Cars** 1. Master key language points and sentence patterns; 2. To understand the cultural background of the automotive industry and global satellite positioning system; 3. Master the general idea of the article; To understand the writing characteristics and skills of English expository; **Unit 3：Get the Job You Want** 1. Master key language points and sentence patterns; 2. Master key language points and sentence patterns; To understand the cultural background of marathon, Michael Jordan and Roger Bennett; 3. Master the general idea of the article; Understand the importance of proper examples to express opinions; **Unit 4：In Search of Davo's Man** 1. Master key language points and sentence patterns; 2. Master key language points and sentence patterns; Understand the cultural background of globalization, the world economic forum, Davos and Ms. Manila; 3. Master the general idea of the article; Appreciate the ways and techniques of the author to present different views objectively; **Unit 5：A Friend in Need** 1. Master key language points and sentence patterns; 2. Master the general idea of the article; The way and skill of strong contrast when describing characters' personality; **Unit 6：Old Father Time Becomes a Terror** 1. Master key language points and sentence patterns; 2. Understand the cultural background of relevant work pressure and science and technology; 3. Master the general idea of the article; The author appreciates the author's application of different writing skills such as concession, direct quotation and fact support; **Course Name: English for IT Professionals** **Course objectives:** Through the study of this course, students can achieve the following objectives: 1. Be able to express their professional knowledge in English 2. Master basic reading skills and a certain amount of relevant professional vocabulary in scientific and Technological English. 3. Have a certain understanding of industry culture and corporate behavior, and have the basic ability to conduct business activities in international IT companies.

	Key knowledge ： **Unit 1 Overview of IT Industry** 1.Unit Overview 2.Culture Reading 3.Communicative Skills Training 4.Expertise Development 5.Hands-on Practice 6.Performance Review **Unit 2History of IT Industry** 1.Unit Overview 2.Culture Reading 3.Communicative Skills Training 4.Expertise Development 5.Hands-on Practice 6.Performance Review **Unit3: Milestones and Giants in IT Industry** 1.Unit Overview 2.Culture Reading 3.Communicative Skills Training 4.Expertise Development 5.Hands-on Practice 6.Performance Review **Unit4: Working Process of IT Industry** 1.Unit Overview 2.Culture Reading 3.Communicative Skills Training 4.Expertise Development 5.Hands-on Practice 6.Performance Review **Unit5: Features of IT Products** 1.Unit Overview 2.Culture Reading 3.Communicative Skills Training 4.Expertise Development 5.Hands-on Practice 6.Performance Review **Unit6 : IT Corporate Culture** 1.Unit Overview 2.Culture Reading 3.Communicative Skills Training 4.Expertise Development 5.Hands-on Practice 6.Performance Review **Unit7: Communication in IT Industry**

	1.Unit Overview 2.Culture Reading 3.Communicative Skills Training 4.Expertise Development 5.Hands-on Practice 6.Performance Review **Unit8: Teamwork in IT Industry** 1.Unit Overview 2.Culture Reading 3.Communicative Skills Training 4.Expertise Development 5.Hands-on Practice 6.Performance Review **Unit9: Time Management in IT Industry** 1.Unit Overview 2.Culture Reading 3.Communicative Skills Training 4.Expertise Development 5.Hands-on Practice 6.Performance Review **Unit10: Preparing for the Interview** 1.Unit Overview 2.Culture Reading 3.Communicative Skills Training 4.Expertise Development 5.Hands-on Practice 6.Performance Review
Examination requirements and forms	College English (1): written test College English (2): written test College English (3): written test College English (4): written test English for IT Professionals: written test
Teaching aids	Projector / blackboard / electronic document / display stand / ppt courseware/listening room
Reading list	1. Chief Editor Li Yinhua, new version of College English (2 Second Edition) comprehensive course volume 1 Student Book (with online teaching resources) [M], Shanghai Foreign Language Education Press, 2015 2. Wang Minhua, Li Huiqin, Chen Meifang, Yu Sumei, Wei Baolin, Li Yinhua, new version of College English, Second Edition (12th Five Year Plan): listening and speaking course, Volume 1, student book (with CD) [M], Shanghai Foreign Language Education Press, 2015 3. Wang Xiuzhen, fan Weiwei, Wang Huohuo, Li Jiayun, Wu Fei, Guo Jingjing, new version of College English

	4. Second Edition (12th Five Year Plan): a general reading course, a volume of student book [M], Shanghai Foreign Language Education Press, 2015 5. Feng Shanping, Lu yunyun, Chen Leyi, Zhang Shanshan, Chen Xiafang, Zhu Weifu, Zhou Song, etc., new version of College English Second Edition (New): comprehensive course volume 1 academic test (with MP3 Download) [M], Shanghai Foreign Language Education Press, 2015 6. Chief Editor Li Yinhua, new version of College English (2 Second Edition) comprehensive course 2 volumes of student books (with online teaching resources) [M], Shanghai Foreign Language Education Press, 2015 7. Wang Minhua, Li Huiqin, Chen Meifang, Yu Sumei, Wei Baolin, Li Yinhua, new version of College English, Second Edition (12th Five Year Plan): listening and speaking course, 2 volumes of student books (with CD) [M], Shanghai Foreign Language Education Press, 2015 8. Wang Xiuzhen, fan Weiwei, Wang Huo Huo, Li Jiayun, Wu Fei, Guo Jingjing, new edition of College English, Second Edition (12th Five Year Plan): two volumes of general reading course for students [M], Shanghai Foreign Language Education Press, 2015 9. Feng Shanping, Lu yunyun, Chen Leyi, Zhang Shanshan, Chen Xiafang, Zhu Weifu, Zhou Song, etc., new version of College English Second Edition (New): comprehensive course volume 2 academic test (with MP3 Download) [M], Shanghai Foreign Language Education Press, 2015 10. Chief Editor Li Yinhua, a new version of College English (Second Edition) comprehensive course, 3 volumes of student books (with online teaching resources) [M], Shanghai Foreign Language Education Press, 2015 11. Wang Minhua, Li Huiqin, Chen Meifang, Yu Sumei, Wei Baolin, Li Yinhua, new version of College English Second Edition (12th Five Year Plan): listening and speaking course, 3 volumes of student books (with CD) [M], Shanghai Foreign Language Education Press, 2015 12. Wang Xiuzhen, fan Weiwei, Wang Huo Huo, Li Jiayun, Wu Fei, Guo Jingjing, new edition of College English, Second Edition (the 12th Five Year Plan): three volumes of student books for reading course [M], Shanghai Foreign Language Education Press, 2015 13. Feng Shanping, Lu yunyun, Chen Leyi, Zhang Shanshan, Chen Xiafang, Zhu Weifu, Zhou Song, etc., new version of College English, Second Edition (New): comprehensive course, 3 volumes, academic test (with MP3 Download) [M], Shanghai Foreign Language Education Press, 2015 14. Chief Editor Li Yinhua, a new version of College English (Second Edition) comprehensive course, 4 volumes of student books (with online teaching resources) [M], Shanghai Foreign Language Education Press, 2015 15. Wang Minhua, Li Huiqin, Chen Meifang, Yu Sumei, Wei Baolin, Li Yinhua, new edition of College English, Second Edition (12th Five Year Plan): listening and speaking course, 4 volumes of student books (with CD) [M], Shanghai Foreign Language Education Press, 2015

	16. Wang Xiuzhen, fan Weiwei, Wang Huo Huo, Li Jiayun, Wu Fei, Guo Jingjing, new edition of College English, Second Edition (12th Five Year Plan): four volumes of student books for reading course [M], Shanghai Foreign Language Education Press, 2015 17. Feng Shanping, Lu yunyun, Chen Leyi, Zhang Shanshan, Chen Xiafang, Zhu Weifu, Zhou Song, etc., new version of College English, Second Edition (New): comprehensive course, 4 volumes, academic test (with MP3 Download) [M], Shanghai Foreign Language Education Press, 2015 18. Sun Jie, Li Yi, Zhan Shaobin, practical it English (2nd Edition). People's Posts and Telecommunications Press, July 2014 19.Anna Phillips & Terry Phillips ， Moving into Information Technology．Garnet Education,

Module 12 Occupation Accomplishment Development

Module name	Occupation Accomplishment Development
Module number	Module 12
Course name / semester / credit	Guidance for College Students' Mental Health / 1 / 1ECTS Guidance for College Students' Employment and Vocational Development/ 1 / 0.5ECTS Basics for College Students' Entrepreneurship / 2 / 0.5ECTS Key Career Abilities/ 6 / 1ECTS Practice for College Students' Entrepreneurship/ 7 / 1ECTS
Person responsible for the module(name/professional ranks and titles)	ZENG Guoqing/Lecturer
Lecturer (name/professional ranks and titles)	ZENG Guoqing / Lecturer, LUO Qingming/Lecturer, WANG Xin/Lecturer, CHEN Yifang/Lecturer
Teaching language	Chinese
Course attribute	Guidance for college students' mental health: Compulsory Guidance for College Students' Employment and Vocational Development: Compulsory Key Career Abilities: Compulsory Basics for College Students' Entrepreneurship: Compulsory Practice for College Students' Entrepreneurship: Compulsory
Teaching methods	Lecture/discussion/practice/autonomous learning/demonstration/practice
Workload	Guidance for college students' mental health:Teaching:30hours Guidance for College Students' Employment and Vocational Development:Teaching:15hours Key Career Abilities:Teaching:30hours Basics for College Students' Entrepreneurship:Teaching:15hours Practice for College Students' Entrepreneurship:Teaching:30hours
Credit point	4
Assessment method	Guidance for college students' mental health: homework, questioning and usual examination account for 40%, and course papers account for 60%; Guidance for College Students' Employment and Vocational Development: homework, questions and usual inspection account for 30%, and final examination accounts for 70%; Key Career Abilities: homework, questioning and usual inspection account for 30%, and final examination accounts for 70%; Fundamentals of College Students' innovation and Entrepreneurship: homework, questions and usual inspection account for 30%, and final examination accounts for 70%; Practice for College Students' Entrepreneurship: homework, questions and usual inspection account for 30%, and final examination accounts for 70%;

Prerequisite courses	None
Module objectives/ Intended learning outcomes	● **Module objectives:** Through the learning of this module, students can understand the relevant theories of career development and be familiar with each link of innovation and entrepreneurship. Cultivate the awareness of career entrepreneurship and improve professional quality, master the key abilities and innovative entrepreneurial skills in the workplace, learn self-awareness and career exploration methods, and make scientific career decisions. ● **Intended learning outcomes:** Upon successful learning of this module, students should be able to demonstrate the following learning outcomes: 1. Be able to understand the basic knowledge of mental health and understand the causes of mental problems; Master the basic concepts and scientific methods to ensure mental health, and have the ability to use psychological means to adjust the problems and challenges encountered in their study, life and interpersonal communication. 2. Master self-exploration skills, information search and management skills, career decision-making skills, job search skills, etc. students should also improve various general skills through courses, such as communication skills, problem-solving skills, self-management skills and interpersonal skills. 3. Be able to actively learn the relevant knowledge of innovation and entrepreneurship, and have the relevant ability and quality of innovation and entrepreneurship. 4. Have the ability to communicate, cooperate and work with others. 5. Stimulate students' entrepreneurial enthusiasm, improve college students' awareness of innovation and entrepreneurship in applying their knowledge to practice, and stimulate students' potential innovation and entrepreneurship ability to the greatest extent.
Course name/ Course objectives/Key knowledge	**Course name: Guidance for College Students' Mental Health** **Course objectives:** Through the study of this course, students can achieve the following objectives: 1. Be able to understand the basic knowledge of mental health and understand the causes of mental problems; 2. Master the basic concepts and scientific methods to ensure mental health, and have the ability to use psychological means to adjust the problems and challenges encountered in their study, life and interpersonal communication. Key knowledge: 1. Basic theory of mental health 2. Adaptation

	3. Interpersonal communication 4. Emotion management 5. Self awareness 6. Learning psychology 7. Love psychology 8. Telecommunications and network traps **Course name：Guidance for College Students' Employment and Vocational Development** **Course objectives:** Through the study of this course, students can achieve the following objectives: 1. Master self-exploration skills, information search and management skills, career decision-making skills, job hunting skills, etc.; 2. Improve students' common skills, such as communication skills, problem solving skills, self-management skills and interpersonal skills. **Key knowledge:** 1. Career and professional consciousness 2. Career development plan 3. Improve employment capacity 4. Guidance on job process 5. Career adaptation and development 6. Entrepreneurship education **Course name：Key Career Abilities** **Course objectives:** Through the study of this course, we can achieve the goal of improving students' ability to communicate, cooperate and work with others. Key knowledge: 1. Information collection and processing capacity 2. Project organization and planning ability 3. Horizontal resource integration capability 4. Presentation ability of summary report 5. Upward management capability 6. Environmental system network capability 7. Ability to predict business trends **Course name：Basics for College Students' Entrepreneurship** **Course objectives:** Through the study of this course, students can achieve the following objectives: 1. Be able to actively learn relevant knowledge of innovation and entrepreneurship; 2. Have the ability and quality related to innovation and entrepreneurship. **Key knowledge:**

	1. Innovation wins the future 2. Innovative thinking development 3. Entrepreneurs and entrepreneurial teams 4. Seize entrepreneurial opportunities 5. Raising venture capital 6. Start a business 7. Management of start-ups 8. Internet and Entrepreneurship **Course name：Practice for College Students' Entrepreneurship** **Course objectives:** Through the study of this course, students can achieve the following objectives: 1. Stimulate college students' entrepreneurial enthusiasm; 2.Improve college students' awareness of innovation and entrepreneurship in applying their knowledge to practice; 3. Stimulate students' potential innovation and entrepreneurship ability to the greatest extent. **Key knowledge:** 1. Scientific and technological invention and creation guidance; 2. Guidance of papers, works, topics, etc.; 3. All kinds of innovation and entrepreneurship competitions, science and technology competitions and skill competitions at all levels; 4. Innovation and entrepreneurship training; 5. Project incubation.
Examination requirements and forms	Guidance for College Students' Mental Health：written test Guidance for College Students' Employment and Vocational Development: written test Key Career Abilities：written test Basics for College Students' Entrepreneurship：written test Practice for College Students' Entrepreneurship：written test
Teaching aids	Projector / blackboard / electronic document / display stand / ppt courseware
Reading list	1. CHEN Yueping, Wu Huidong, Zhang Yanyun. Mental health education and development of college students [M]. Beijing: Beijing Normal University Press, 2017 2. ZHANG Jianhua, Zhang Ke. College students' Mental Health Course (Second Edition) [M]. Beijing: Science Press, 2014. 3. TANG Zhiwen. Mental health education for contemporary college students [M]. Beijing: Beijing University of Posts and Telecommunications Press, 2013. 4. WANG Shulan, college students' Mental Health Course [M]. Xi'an: Shaanxi people's education press, 2014. 5. LI Ming, Zhang Xinmei, Chang Sufang, Su Huijun. Mental health

	education for college students [M]. Beijing: Tsinghua University Press, 2013. 6. WANG Li, CAO Shuchun, LI Jing. Theory and practice of College Students' mental health [M]. Beijing: Higher Education Press, 2015. 7. GUI Zhou, ZHANG Shuqian, LUO Yuanhao. Career development and employment guidance for college students (2nd Edition) [M]. Beijing: Tsinghua University Press, 2018 8. ZHANG Huadong, CAO zhandong. Career development education and employment guidance for college students [M]. Beijing: Science Press, 2018. 9. ZHANG Xianglan. Fundamentals of College Students' innovation and entrepreneurship [M]. Beijing: Tsinghua University Press, 2018. 10. AN Shiquan. Key competencies in the workplace [M]. Beijing: People's Posts and Telecommunications Press, 2012 11. LUO Lingling. Innovation ability development and training course [M]. Shenyang: Northeast University Press, 2013.

Module 13 Management and Business

Module name	Management and Business
Module number	Module 13
Course name / semester / credit	Human Resource Management / 1 / 1ECTS Financial Management / 3 / 1ECTS Strategic Management of Enterprises in the Era of "Internet +" / 5 / 1ECTS MBA Case Analysis in Information Industry / 6 / 1ECTS Network Ethics and E-Commerce Regulations / 6 / 1ECTS
Person responsible for the module(name/professional ranks and titles)	LI Dan / Associate Professor
Lecturer (name/professionalranks and titles)	LI Dan / Associate Professor, ZHAO Yan / Associate Professor, FENG Shengnan / lecturer, MAO Youchun / lecturer, WANG Cao / lecturer, XIA Fei / lecturer, YANG Mengya / lecturer, CHENG Jiani / Assistant, GENG Chenyang / Assistant, PAN Yingjie / Assistant, QIU Yuchang / Assistant, TAO Chunlin / Assistant,
Teaching language	Chinese
Course attribute	Human Resource Management: compulsory Financial Management: compulsory Strategic Management of Enterprises in the Era of "Internet +": compulsory MBA Case Analysisin in Information Industry: Elective Course Network Ethics and E-Commerce Regulations: Elective Course
Teaching methods	Lecture / discussion / practice / autonomous learning / presentation
Workload	Human Resource Management: Teaching: 30 hours Financial Management: Teaching: 30 hours Strategic Management of Enterprises in the Era of "Internet +": 30 hours MBA Case Analysis in Information Industry: Teaching: 30 hours Network Ethics and E-Commerce Regulations: Teaching: 30 hours
Credit point	4
Assessment method	Human Resource Management: homework, questions and usual inspection account for 40%, and final examination accounts for 60%. Financial Management: homework, questions and usual inspection account for 40%, and final examination accounts for 60%. Strategic Management of Enterprises in the Era of "Internet +": homework, questions and usual inspection account for 40%, and final examination accounts for 60%.

	MBA Case Analysis in Information Industry: homework, questions and usual inspection account for 40%, and final examination accounts for 60%. Network Ethics and E-Commerce Regulations: homework, questions and usual inspection account for 40%, and final examination accounts for 60%.
Prerequisite courses	None
Module Objectives / Intended Learning Outcomes	● **Module course objectives:：** Through the study of each course of the management and business module, students can master the basic theories and methods of modern enterprise management, master the basic functions of enterprise strategic management, human resource management, marketing and financial management, and improve their ability to solve practical problems, help students how to think from the perspective of business and exercise students' strategic thinking; through learning, establish new ideas, change work attitude, and finally be able to be applied in work; in this way, we can "focus on the big and start with the small" in the enterprise, play a good management role at present, gradually accumulate, and become the leadership ability of middle and senior management in the future. ● **Module learning purpose：** Upon successful learning of this module, students should be able to demonstrate the following learning outcomes: 1.Make rational use of relevant knowledge in management and establish scientific management concept. 2.Master scientific management methods, market analysis methods, human resource management methods etc., and be familiar with financial management knowledge. 3.Have the basic management ability of leaders. 4.Master the general laws of management and can be comprehensively applied to the analysis of practical problems, and preliminarily have the basic ability of strategic planning, organizational behavior management, consumer psychological management, investment and financing management and advertising planning and implementation.
Course Name / Course Objectives /Key Knowledge	**Course Name: Human Resource Management** **Course Objectives:** Through the study of this course, students can achieve the following objectives: 1.Correctly understand the concept of human resource management 2.Master the basic principles and general methods of human resource management, and be able to comprehensively apply them

	to the analysis of practical problems 3. Have the ability to solve general HRM problems preliminarily; **Key Knowledge：** 1.Overview of human resources and human resources management 2. Position analysis and competency model 3. Human resources planning 4. Recruitment 5. Training and development 6. Performance management 7. Salary management 8. Labor relations (organizational behavior analysis etc.) **Course Name: Financial Management** **Course objectives:** Through the study of this course, students can achieve the following objectives: 1. Correctly understand the concept of financial management 2. Master the basic theory of financial management and be able to use the learned theory for relevant case analysis; 3. Cultivate students' ability to use the basic methods and skills of financial management and make financial decisions. **Key Knowledge ：** 1. Introduction to financial management 2. Basic concept of financial management (strategic perspective) 3. Financial analysis 4. Fund raising management (Part 1) 5. Fund raising management (Part 2) 6. Investment management 7. Working capital management 8. Income distribution management **Course Name: Enterprise Strategic Management in the Era of "Internet+"** **Course Objectives:** Through the study of this course, students can achieve the following objectives: 1. Master the basic concepts and contents of enterprise strategic management 2. Be able to preliminarily use the basic ideas and methods of management to analyze and solve management problems. 3. Master the basic abilities of leadership decision-making, organization and coordination, communication etc. 4. Have scientific thinking mode, good logical thinking ability, strong language ability and interpersonal skills.

	Key Knowledge ： 1. Strategy and strategic management 2. Vision, mission and strategic objectives 3. Enterprise external environment analysis 4. Enterprise internal environment analysis 5. Company level strategy 6. Management strategy 7. Functional level strategy 8. Internationalization strategy 9. Strategy and resource allocation 10. Strategy and corporate governance 11. Strategy and organizational structure 12. Implementation of diversification strategy 13. Strategic control and evaluation **Course Name: MBA Case Analysis in Information Industry** **Course objectives:** Through the study of this course, students can achieve the following objectives: 1. Understand the background of information industry; 2. Systematically master the basic methods and Strategies of strategic management, financial management, brand marketing and human resource management of information industry enterprises; 3. Acquire the ability to analyze and solve relevant problems of information industry enterprises. **Key Knowledge ：** 1. Information industry background cognition 2. Introduction to management cases 3. Analysis methods of management cases 4. Strategic management analysis of information industry enterprises 5. Cases analysis of financial management of information industry enterprises 6. Cases analysis of enterprise brand and marketing management of information industry enterprises 7. Human resource management cases of information industry enterprises 8. Comprehensive cases analysis of information industry **Course Name: Network Ethics and E-Commerce Regulations** **Course Objectives:** Through the study of this course, students can achieve the following objectives: 1. Understand the importance of network ethics;

	2. The basic content of network ethics; 3. The importance of the legal system of e-commerce; 4. Specific contents of e-commerce law. **Key Knowledge ：** 1. Origin of network ethics 2. Ethical issues of network 3. Characteristics of network ethics 4. Loss and standardization of network ethics 5. The basic category of network ethics 6. Special category of network ethics 7. Network ethics education 8. Legal system of electronic commerce 9. Legal system of network intellectual property 10. Network security and crime
Examination requirements and forms	Human Resource Management: written examination Financial Management: written examination Strategic Management of Enterprises in the Era of "Internet+": written examination MBA Case Analysis in Information Industry: written examination Network Ethics and E-Commerce Regulations: written examination
Teaching aids	Projector / blackboard / electronic document / display stand / ppt courseware/laboratory
Reading list	1. ZHAO Zhangwen. Financial management [M]. Beijing: Science Press, 2011 2. WANG Huacheng. Financial management [M]. Beijing: China Renmin University Press, 2013 3. HAI Bo, JIANG Ying. Financial management [M]. Shanghai: Lixin Accounting Press, 2015 4. Philip Kotler, Kevin Leith Keller etc., translated by Wang Yonggui etc. Marketing Management (14th Edition) [M]. Beijing: China Renmin University Press, 2012 5. SUN Xi. Marketing (Second Edition) [M]. Beijing: Science Press, 2016 6. WU Jian'an. Marketing (Fifth Edition) [M]. Beijing: Higher Education Press, 2014 7. GUO Guoqing. General Theory of Marketing (Sixth Edition) [M]. Beijing: China Renmin University Press, 2014 8. DONG Keyong. Introduction to Human Resource Management (Fourth Edition) [M]. China Renmin University Press, 2016 9. QIAO Rui, PAN Zhiyong. Introduction to Human Resource Management [M]. People's Posts and Telecommunications Press, 2015

10. Robbins. Management [M]. Beijing: China Renmin University Press, 2009
11. JI Dingzhong, GE Yuanyue. Management (Second Edition) [M]. Beijing: Science Press, 2011
12. (US) Amir Hartman etc., Network Ready [M]. China Machine Press, 2000.
13. (US) Peter F. Drucker etc., Future Management [M]. Sichuan people's publishing house, 2000
14. WANG Zhiyuan. Winning the Information Age [M]. Xinhua Publishing House, 2000
15. Translated by LIN Li etc., Global Information Strategy [M]. Xinhua Publishing House, 2000.
16. LI Gaoyong, MAO Jiye. Case Selection and Research Strategy - Summary of China Enterprise Management Case and Qualitative Research Forum (2014) [J]. Management World. 2015 (02):55-59.
17. ZHOU Ying. Research on Innovation and Application Upgrading of Financial Industry Enabled by Big Data Technology [J]. Science, Technology and Economy Guide. 2019 (09):68-72.
18. CHEN Ziyang. Application of Big Data Technology in the Financial Industry -- Comment on the Third Series of Practical Case Analysis of Big Data in the Financial Industry [J]. Journal of Guangdong University of Finance and Economics. 2019 (06):28-32.
19. BAI Boran. Application of Big Data Fechnology in Internet Finance [J]. Modern Economic Information. 2018 (22):101-104.
20. QIAN Zhijun. Application of Software Technology and Big Data in Postal Enterprises [J]. 2018(02):121-124.
21. ZHAO Zhangwen. Enterprise Strategic Management: Methods, Cases and Practices (2nd Edition) [M]. Beijing: Machinery Industry Press, 2018.
22. Fred R. David. Strategic Management: Concepts and Cases (13th Edition • Global Edition) [M]. Beijing: China Renmin University Press, 2019.
23. Michael A. Hitter. Strategic Management: Competition and Globalization (Concept) [M]. Beijing: China Machine Press, 2019.
24. LIU Yong, Lin Hongzhen. Online Advertising. [M]. Dalian: Northeast University of Finance and Economics Press, 2018.
25. YANG Lifan. Online Advertising [M]. Beijing: Electronic Industry Press, 2016.
26. DAI Yongming, Jiang Enming. Network Ethics and Regulations. Fujian: Fujian People's Publishing House, 2005.
27. HUANG Hu. A Course on Laws, Regulations and Ethics of Network Communication. Shanghai: Fudan University Press, 2018.

Module 14 The Ability to Practice of Morals, Intelligence, Physical Fitness and Aesthetics

Module name	The Ability to Practice of Morals, Intelligence, Physical Fitness and Aesthetics
Module number	Module 14
Course name / Semester / Credit	Military Training (Including military theory courses, admission and safety education)/ 1 / 1 ECTS Physical Education (1) / 1 / 1 ECTS Physical Education (2) / 2 / 1 ECTS Physical Education (3) / 3 / 1 ECTS Physical Education (4) / 4 / 1 ECTS Celebrity Forum / 1 / 1 ECTS Famous Teacher Class / 1 / 1 ECTS Ideological Education and Fundamentals of Law / 1 / 1 ECTS Introduction to Maoism and Theoretical System of Socialism with Chinese Characteristics / 5 / 1.5 ECTS Outline of Modern Chinese History / 3 / 1.5 ECTS Basic Principles of Marxism / 6 / 2 ECTS Situation and Policy / 8 / 0 ECTS（This course is not counted into credits） On Justice / 5 / 1 ECTS Appreciation of Classic Movies / 1 / 1 ECTS Persuasion and Reasoning / 1 / 1 ECTS Information Technology and Society / 4 / 1 ECTS Ethics in Life Sciences / 5 / 1 ECTS History of Western Philosophy (Russell) / 5 / 1 ECTS
Person responsible for the module(Name/Professional ranks and titles)	Fu Zhonghu / Lecturer
Lecturer(Name/Professional ranks and titles)	Fu Zhonghu / Lecturer, Cui Qiaoyu / Lecturer, Ao Hong / Lecturer, he Shunxiang / Lecturer, Liu Guangye / Lecturer, Luo Bo / Lecturer
Teaching language	Chinese
Course attribute	Military Training: Compulsory Physical Education (1): Compulsory Physical Education (2): Compulsory Physical Education (3): Compulsory Physical Education (4): Compulsory Celebrity Forum: Elective Famous Teacher Class: Elective

	Ideological Education and Fundamentals of Law: Compulsory Outline of Modern Chinese History: Compulsory Introduction to Maoism and Theoretical System of Socialism with Chinese Characteristics: Compulsory Basic Principles of Marxism: Compulsory Situation and Policy: Compulsory On Justice: Compulsory Appreciation of Classic Movies: Elective Persuasion and Reasoning: Elective Information Technology and Society: Elective Ethics in Life Sciences: Elective History of Western Philosophy (Russell): Elective
Teaching methods	Explanation / Demonstration / Practice / Discussion / Multimedia / Competition / Activity / Training / Conversation / Summarization / Lecture/ Practical activity
Workload	Military Training: Teaching: 30 hours Physical Education (1): Teaching: 30 hours Physical Education (2): Teaching: 30 hours Physical Education (3): Teaching: 30 hours Physical Education (4): Teaching: 30 hours Celebrity Forum: Teaching: 30 hours Top-teacher Class: Teaching: 30 hours Ideological Education and Fundamentals of Law: Teaching: 30 hours Outline of Modern Chinese History: Teaching: 45 hours Introduction to Maoism and Theoretical System of Socialism with Chinese Characteristics: Teaching: 45 hours Basic Principles of Marxism: Teaching: 60 hours On Justice: Teaching: 30 hours Appreciation of Classic Movies: Teaching: 30 hours Persuasion and Reasoning: Teaching: 30 hours Information Technology and Society: Teaching: 30 hours Ethics in Life Sciences: Teaching: 30 hours History of Western Philosophy (Russell): Teaching: 30 hours
Credit point	16
Assessment method	Physical Education (1)-(4): 20% for attendance and general performance assessment, 60% for special technical assessment ball technique + competition, 20% for quality assessment 1000m. Celebrity Forum: 40% for attendance and general performance, 60% for course papers. Famous Teacher Class: 40% for attendance and general performance, 60% for course paper. Ideological Education and Fundamentals of Law: 50% for assignments, question-asking and practice, 50% for the final exam. Outline of Modern Chinese History: 50% for assignments,

	question-asking and practice, 50% for the final exam. Introduction to Maoism and Theoretical System of Socialism with Chinese characteristics: 50% for assignments, question-asking and practice, 50% for the final exam. Introduction to Basic Principles of Marxism: 50% for assignments, question-asking and practice, 50% for the final exam. On Justice: 40% for assignments, question-asking and routine examination, 60% for the final exam. Appreciation of Classic movies: 40% for assignments and general performance, 60% for the final exam. Persuasion and reasoning: 40% for assignments and general performance, 60% for the final exam. Information Technology and Society: 40% for assignments and general performance, 60% for the final exam. Ethics in Life Science: 40% for assignments and general performance, 60% for the final exam. History of Western Philosophy: 40% for assignments and general performance, 60% for the final exam.
Prerequisite courses	None
Module Objectives/Intended Learning Outcomes	**Module course objectives:** Through the study of this module, the students will achieve the all-round development in the aspects of morals, intelligence, physical fitness and aesthetics. **Module learning purpose:** This module helps students to solve the pratical problems encountered in their growth and propotes their comprehensive development. Students should be able to demonstrate the following learning outcomes: 1. Improvements on the comprehensive quality, including the improvements on physical fitness and military quality, the mastery of the basic military theory, the enhancements of the national defense concept and national security awareness, the reinforcements of patriotism and collective spirit, and the enhancements of organizational discipline; 2. A Healthy personality and psychology; 3. A correct outlook on life, values, morality and legal system; 4. A correct understanding of the current state of society of China and the fulfillment of self-value; 5. Good team spirit, effective communication, coordination and cooperation ability.
Course name / course objectives /Key knowledge	**Course Name:** Military Training **Course objectives:** Through the study of this course, students will achieve the following objectives: 1. Understand the importance of national defense; 2. Understand the development law of military theory and the main military thoughts of China;

	3. Understand the security environment around China; 4. Understand the current advanced military high technology in the international community; 5. Master the current pattern of international information warfare; 6. Master the PLA regulations and basic skills training; 7. Enhance the legal concept and safety awareness of college students to improve their legal quality and prevention capability. **Core knowledge points:** 1. China's national defense 2. Military thoughts 3. International strategic environment 4. Military high technology 5. Information war 6. Regulation education and training 7. Comprehensive military training 8. Prevention of electric shock and fire accidents 9. Prevention of network fraud 10. The right way to defend oneself and deal with sexual assault 11. Prevention of illegal pyramid schemes 12. Prevention of cyber crime 13. Master the prevention of alcoholism, gambling and drug-related problems **Course Name:** Physical Education (1) (2) (3) (4) **Course objectives:** Through the study of the four physical education courses, students can achieve the following objectives: 1. Master the basic skills of basketball, volleyball, football, 24 simplified Tai Chi, aerobics, swimming and other popular sports. 2. Ensure the physical and mental health of college students; 3. Develop good sports awareness and lifelong exercise habit. **Core knowledge points:** 1. Swimming related competition rules, various techniques and tactics and training; 2. Basketball related competition rules, various techniques and tactics and training; 3. Football related competition rules, various techniques and tactics and training; 4. Volleyball related competition rules, various techniques tactics and training; 5. Middle and long distance running practice: 1000 / 800m; 6. Basic movement essentials and training of Tai Chi. **Course Name:** Celebrity Forum / Famous Teacher Class

	Course objectives: The course of Celebrity forum / and Famous teacher class will achieve the following objectives: 1. Comprehensively improve students' awareness of various disciplines, understand the development history, current status and future plans of various disciplines and fields. Meanwhile, train students according to their own characteristics and development plans. 2. Lead students to sort out, expand and extend their knowledge; 3. Explore the law of knowledge development and the way of knowledge trasfer; 4. Improve students' divergent thinking, interdisciplinary knowledge application and research level; 5. Meet the diversified needs of students and cultivate innovative talents. **Course Name:** Ideological Education and Fundamentals of Law **Course objectives:** Through the study of this course, students will achieve the following objectives: 1. Understand that college is an important period of life development and cherish the good time in college. 2. Establish a correct outlook on world, life and values. 3. Understand the basic spirit and main provisions of China's socialist constitution and relevant laws, truly learn, understand and use the law, act in accordace with the law, safeguard the legitimate rights and interests of the country and individual citizens and conscientiously perform legal obligations. **Core knowledge points:** 1. The characteristics of college life, the basic concepts of ideology, morality and law, the basic contents of socialist core values, and the significance of cultivating and practicing socialist core values. 2. The meaning, characteristics and significance of ideals and beliefs, the content and meaning of the common ideal of socialism with Chinese characteristics, the relationship between ideal and reality, personal ideal and social ideal. 3. The Chinese spirit is the unity of the national spirit and the spirit of the times. Thus the students should master the basic content of the national spirit, patriotism and its value of the times and the spirit of the times and its main embodiment. 4. The main content of the outlook on life, the standard and evaluation of the value of life, the conditions for the realization of the value of life, and the pecific methods to promote the harmony

	of life environment. 5. The origin and essence of morality, the function of morality, the historical development of morality, the contemporary value and basic spirit of Chinese traditional virtue, the main content of Chinese revolutionary morality and the core and principle of socialist moral construction. 6. The basic content of moral norms in public life and the moral requirements in network, ethics in professional life, the moral norms in love, marriage and family, the basic contents of college students' view on love, marriage and family virtues. 7. The etymology and meaning of law, the essence and characteristics of law, the role of socialist law, and the operation of socialist law; The basic principles and systems of the establishment of China's constitution, the substantive law departments and the procedural law departments of China. 8. The meaning and characteristics of the rule of law thinking and the basic content of the rule of law thinking, the way to develop the rule of law thinking and the significance and basic requirements of respecting the authority of law. 9. The concept of legal rights and obligations, and the relationship between legal rights and legal obligations, the basic rights and obligations of citizens stipulated in the constitution of China, the procedures and requirements for exercising rights according to law, relieving rights according to law, respecting the rights of others and performing obligations according to law. **Course Name:** Introduction to Maoism and Theoretical System of Socialism with Chinese Characteristics **Course objectives:** Through the study of this course, students will achieve the following objectives: 1. Master the basic theories of Mao Zedong Thought and the theoretical system of socialism with Chinese characteristics 2. Understand the historical process that Communist Party of China integrated the basic principles of Marxism with China's reality. 3. Firmly follow the ideal and faith of taking the road of socialism with Chinese characteristics under the leadership of the Communist Party of China. 4. Consciously adhere to the party’s basic theory, basic line and basic program. **Core knowledge points:** 1. The history and scientific connotation of Sinicization of Marxism, the formation, historical position and main contents of

	Mao Zedong Thought, the formation and main contents of the theoretical system of socialism with Chinese characteristics, the scientific connotation of the ideological line - seeking truth from facts. 2. The national conditions of modern China and the characteristics of the Chinese revolution, the road and basic experience of the new democratic revolution, the general line and basic program of the new democracy, the three magic weapons of the new democratic revolution. 3. The proposal, theoretical basis and content of the general line during the transition period, the theoretical basis for the establishment of the basic socialist system, the road and historical experience of socialist transformation suited to Chinese characteristics. 4. The experience and lessons from the preliminary exploration of the socialist construction, the idea of mobilizing all positive factors to serve the socialist cause, correctly understand and handle the contradictions in socialist society. 5. The formation, scientific meaning and main characteristics of the theory of the primary stage of socialism, the party's basic line and program in the primary stage of socialism. 6. The essence of socialism and the proposal of the "Chinese dream", the scientific connotation and significance of the theory of socialist essence, the fundamental task of socialism, the "three steps" development strategy, the requirement of building a well-off society in an all-round way, the connotation of the Chinese dream. 7. The theoretical and practical basis of reform and opening up, the form, principle and pattern of opening up and the significance of strengthening international exchanges and cooperation, the main content, nature and purpose of the reform and the relationship between reform, development and stability. 8. The basic economic system and distribution system in the primary stage of socialism, the socialist democratic political system with Chinese characteristics, the fundamental task of socialist culture with Chinese characteristics, the scientific meaning of building a socialist harmonious society, strengthen the construction of ecological civilization. 9. The formation and development of the concepts of "peaceful reunification" and "one country, two systems", the successful practice of the concept of "one country, two systems" in Hong Kong and Macao and its basic contents and significance, guidelines for Taiwan Work under the new situation. 10. Mao Zedong's analysis of the international situation after World War II, Deng Xiaoping's new judgment on the theme of the

	times, the formation and development of an independent peaceful foreign policy and its basic principles. 11. The fundamental force for building socialism with Chinese characteristics, modernization of national defense and the armed forces, the contents and basic tasks of the patriotic united front in the new era, the party's ethnic and religious policies in the new era. 12. The nature and purpose of the Communist Party of China; The basis and method of building a learning, service-orieted and innovative Marxist ruling party. **Course Name:** Outline of Modern Chinese History **Course objectives:** Through the study of this course, students will achieve the following objectives: 1. Understand the historical process and internal laws of social development and revolutionary development in modern China. 2. Understand that modern China is a history of heroic struggle and arduous exploration by generations of people with lofty ideals to save the nation from subjugation and realize the great rejuvenation of the nation, understand the history of the people of all nationalities throughout the country winning national independence and people's liberation through the new democratic revolution under the leadership of the Communist Party of China, and the history of socialist revolution, construction and reform, the history of turning an extremely poor and weak old China into a socialist new prosperous China full of vitality and vigor. **Core knowledge points:** 1. Capital -- the process of imperialist aggression against China 2. The rise and fall of the Storm of Peasant Mass Struggle, the rise and fall of the Westernization Movement, the rise and fall of the Restoration Movement. 3. The banner of modern national democratic revolution. 4. The history of the New Culture and the May 4th Movement, the further spread of Marxism and the birth of the Communist Party of China. the historical conditions, characteristics and significance of the founding of the Communist Party of China, the new situation of the Chinese revolution. 5. The arduous exploration of the new revolutionary road, the tortuous progress made in the exploration of Chinese revolution, the opening of the revolutionary road of Encircling Cities from rural areas. 6. The aggressive war to destroy China launched by Japan, the Communist Party of China became the mainstay of the Anti Japanese War, the victory of the Anti-Japanese War and its reasons

	and significance. 7. From striving for peace and democracy to waging a war of self-defence, the encircment of Kuomintang government by the people, the cooperation between the Communist Party of China and the democratic parties, the reation of a new China under the people's democratic dictatorship. 8. The beginning of the transition from New Democracy to socialism, the socialist road is the choice of history and the people, the significance of establishing the basic socialist system. 9. The good start, setbacks and achievements made by Communist Party of China in the exploration of socialist construction. 10. The new situation of reform, opening up and modernization, the cross century development of the cause of socialism with Chinese characteristics, promoting socialism with Chinese characteristics at a new historical starting point, opening up a broader development prospect of socialism with Chinese characteristics, unswervingly advancing along the road of socialism with Chinese characteristics. **Course Name:** Basic Principles of Marxism **Course objectives:** Through the study of this course, students will achieve the following objectives: 1. Master the basic viewpoints of dialectical materialism and historical materialism and establish a correct outlook on worold, life and values; 2. Learn to understand and handle various practical problems with scientific thinking and working methods; 3. Establish the ideal and faith of building socialism with Chinese characteristics, consciously adhere to the party's basic theory, basic line and program; 4. Cultivate a new generation with ideals, morality, culture and discipline. **Core knowledge points:** 1. The basic connotation of Marxism, the subjective and objective conditions for the formation of Marxism. 2. The concept, basic problems and existing forms of matter, the concepts of materialism, idealism, epistemology and agnosticism, the consciousness, the concept and classification of connections, the concept and essence of development, the concept and relationship of qualitative change and quantitative change, the basic content of dialectical negation. 3. The basic concepts of practice, cognition, truth, value, necessity and freedom, understanding and transforming the world, the

	decisive role of practice in cognition, the essence of cognition and its development law, the characteristics of truth and its test criteria, the unity of truth and value, understanding and transforming the world. 4. The basic concepts of social existence, social consciousness, material production mode, productivity, production relations, economic foundation, superstructure, country, class, and people, the historical materialism and idealism，the basic contradiction and the movement law of human society, the basic law and dynamic system of social development, the people are the creators of history and the decisive force of historical development. 5. The basic contradiction of commodity economy based on private ownership, the labor value theory and its significance, the surplus value theory and its significance, the basic contradiction of capitalism and economic crisis, the capitalist political system and ideology. 6. The formation and characteristics of private monopoly capitalism, the characteristics and essence of the state monopoly capitalism, the manifestation and consequence of economic globalization, the historical position of capitalism and the its inevitability replacement by socialism. 7. The three stages of the development of utopian socialism, the basic principles of scientific socialism, the protracted and arduous nature of socialist construction. 8. The basic concepts of communism, the essential characteristic of communism, the free and all-round development of human beings, and the necessity of the communist society in historical development. **Course Name:** Situation and Policy **Course objectives:** Through the study of this course, students can achieve the following objectives: 1. Help students correctly understand the political and economic situation of the country, as well as the international environment and historical background where the country's reform and development are located; 2. Correctly understand the Party's basic line, major principles and policies, correctly analyze the hot issues of social concern, stimulate students' patriotic enthusiasm, enhance their national self-confidence and sense of social responsibility, grasp the future, study hard, and serve the country. **Core knowledge points:** 1. Five years of hard work

	2. New changes in the international counter-terrorism situation and its impact 3. Fully understand the "the Belt and Road" 4. Review and Prospect of Hong Kong's return to China in the past 20 years. **Course Name:** On Justice **Course objectives:** Through the study of this course, students can achieve the following objectives: 1. Master the justice theory in Western thought, provide ideological resources for the research and judgment of social justice, fairness and other issues, and 2. Cultivate the ability of abstract thinking and critical thinking. **Core knowledge points:** 1. Introduction 2. Logical fallacy 3. God 4. Reality 5. Sophocles and Antigone 6. Socrates and The Plea 7. Plato's Republic 8. Hobbes and Leviathan 9. Locke and on Government 10. Rousseau and Social Contract Theory 11. Moral theory: Utilitarianism 12. Moral theory: Obligation Theory 13. Moral theory: Virtue Ethics 14. Rawls and The Theory of Justice 15. Justice as fairness: a probe into various justice issues **Course Name: Information Technology and Society** **Course objectives:** Through the study of this course, students can achieve the following objectives: To cultivate students' attitude of rational thinking, on the one hand, students can reasonably use information technology for our own use, on the other hand, students can get rid of the shackles brought by information technology and be free in thinking. **Core knowledge points:** 1. Concept and characteristics of information technology 2. Development history of information technology 3. Development history of the Internet 4. Impact on social development

	5. Impact on economic growth mode. 6. Impact on scientific and technological progress 7. Impact on people's work, life and study 8. Emergence of digital divide 9. Information flooding and information pollution. 10. Cybercrime 11. Personal information disclosure 12. Other negative impacts 13. Narrow the digital divide and deal with information flooding and information pollution reasonably 14. Be vigilant against cybercrime 15. National level: speed up the introduction of the personal information protection law 16. Correctly understand the impact of information technology on us **Course Name:** Ethics in Life Science **Course objectives:** Through the study of this course, the following objectives are achieved: Cultivate students' ability to think about human life science and ethical issues, and explore the concern of life science and technology in contemporary society and the relationship with human life; life science and technology and the prospect of human future world; and the importance of life care. **Core knowledge points:** 1. Overview of Bioethics 2. Human assisted reproductive technology and its ethics 3. Human embryonic stem cell research and its ethics 4. Cloning technology and its ethics 5. Organ transplantation and its ethics 6. Human genome project and its ethics 7. Transgenic technology and its ethics 8. Animal experiment and its ethics 9. Human testing and its ethics 10. AIDS and its ethics 11. Ethical thinking on disease and health 12. Euthanasia and hospice care **Course Name:** History of Western Philosophy **Course objectives:** Through the study of this course, students can achieve the following objectives: Let students learn the historical context of western philosophy and

	understand the role of Philosophy in promoting the development of Western civilization. On this basis, learn to use philosophical thinking and critical spirit to think independently. **Core knowledge points:** 1. Introduction 2. The dichotomy of Western Philosophy 3. Main branches of Western Philosophy 4. Nine schools of western philosophy and their representatives 5. Pre-Socratic philosophy 6. Ancient Greek Philosophy 7. Christian Philosophy 8. Political philosophy 9. Rationalism 10. Empiricism 11. German classical philosophy 12. Philosophy of Voluntarism
Examination requirements and forms	Military Training: on-site assessment Physical Education (1) (2) (3) (4): written examination, on-site assessment Famous Teacher Forum / Class: course paper Ideological and Moral Cultivation and Legal Basis: written examination Introduction to Mao Zedong Thought and the Theoretical System of Socialism with Chinese Characteristics: written examination Outline of Modern Chinese History: written examination Introduction to Basic Principles of Marxism: written test Situation and Policy: written test On Justice: written examination Information Technology and Society: written examination Ethics in Life Science: written examination History of Western Philosophy (Russell): written examination
Teaching aids	Multimedia, blackboard, professional high-altitude challenge facilities and venues, new media, community activity positions, etc
Reading list	1. Marx and Engels Complete works of Marx and Engels [M] Beijing: People's publishing, 1982 2. Mao Zedong Selected works of Mao Zedong [M] Beijing: People's publishing house, 1991 3. Deng Xiaoping Selected works of Deng Xiaoping [M] Beijing: People's publishing house, 1994 4. Jiang Zemin Selected works of Jiang Zemin [M] Beijing: People's publishing house, 2006 5. Hu Jintao Selection and compilation of important documents since the 16th National Congress of the Communist Party of China

	(2) [g] Beijing: Central Literature Publishing House, 2006 Beijing: Foreign Language Press, 2014 7. [UK] Mike Schoenberg, [UK] kuckye. The age of big data [M]. Zhejiang People's publishing house, 2013 8. You Ruien van den Huo Wen, etc., editor in chief, translated by Zhao Yinghuan, song Jixin and Zhang Qin. Information technology and Moral Philosophy [M]. Science Press Co., Ltd., 2017 9. Xu Xueyu, information technology and economic and social development [M]. Xi'an Jiaotong University Press, 2010 10. [US] Darrell M. West, translated by Liao Yimin, proofread by Gao Shiji, the next wave: social and political innovation driven by information and communication technology [M]. Shanghai Far East Press, 2012 11. Zhao Dunhua. A brief history of Western Philosophy [M]. Beijing: Peking University Press, 2001 12. Robert Solomon. Big problems - Introduction to concise Philosophy [M]. Guilin: Guangxi 13. Normal University Press, 2011 14. Hegel. Lectures on the history of Philosophy [M]. Beijing: Commercial Press, 1997 15. John McClellan. History of Western political thought [M]. Beijing: CITIC press, 16. Zhao Dunhua. A brief history of Western Philosophy [M]. Beijing: Peking University Press, 2001